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AMMANN AND WHITNEY

REPORT TO NEW JERSEY
STATE HIGHWAY DEPT.

REPORT TO

NEW JERSEY STATE HIGHWAY DEPARTMENT

and

DELAWARE RIVER PORT AUTHORITY

on

Preliminary Plans for New Jersey Approaches
and Highway Connections

to

DELAWARE RIVER BRIDGE

between

Philadelphia, Pennsylvania and Gloucester, New Jersey

by

AMMANN & WHITNEY
Consulting Engineers

May, 1953

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ORSE PIKE
BRANCH
BOULEVARD
ANCH
NORTH
C
NORTH-SOUTH FREEWAY
SOUTH
GLOUCESTER
BRANCH
Michele

Plate I

NEW JERSEY APPROACHES TO DELAWARE RIVER BRIDGE

BETWEEN PACKER AVENUE, PHILADELPHIA,
AND GLOUCESTER, NEW JERSEY

Plate I

OTHMAR H. AMMANN
CHARLES S. WHITNEY

MILTON BRUMER
WERNER AMMANN
BOYD G. ANDERSON

LEOPOLD H. JUST
HOMER GRAY

MILWAUKEE OFFICE
724 EAST MASON STREET
MILWAUKEE 2, WISCONSIN
BROADWAY 6-8374

AMMANN & WHITNEY
Consulting Engineers
76 NINTH AVENUE
NEW YORK 11, N. Y.
WATKINS 4-8282

DESIGN AND SUPERVISION
OF CONSTRUCTION
OF
BRIDGES
SPECIAL STRUCTURES
INDUSTRIAL PLANTS
FOUNDATIONS AND BUILDINGS
AIRPORT FACILITIES
EXPRESSWAYS

INVESTIGATIONS & REPORTS

May 29, 1953

The Honorable R. J. Abbott
State Highway Commissioner
Trenton, New Jersey

Mr. Joseph K. Costello, Executive Director
Delaware River Port Authority
Administration Building
Camden, New Jersey

Gentlemen:

In accordance with our agreement with the New Jersey State HighwayDepartment, dated January 5, 1953, we submit herewith our report on preliminary plans and studies for the New Jersey approaches and highway connections of the Delaware River Bridge between Packer Avenue, Philadelphia, Pennsylvania and Gloucester, New Jersey.

MAY 4 1955 ZIP BRANCH

This report was to be based on a traffic survey made for the Delaware River Port Authority by Coverdale and Colpitts. Use was also made of information furnished us by the New Jersey State Highway Department on traffic, property values and physical conditions.

Throughout the study we received the full cooperation and valuable assistance of the Engineering Staffs of the New Jersey State Highway Department and the Delaware River Port Authority.

Scope of Studies

The studies were to embrace the development of a general plan of the bridge approaches and highway connections east of the intersection of the main bridge approach and Newton Creek. Design drawings were to be prepared, illustrating types, dimensions and principal features of the structures, alignment, profiles and methods of supporting structures and embankments. The study was also to include preliminary topo-

graphic surveys, property maps and cost estimates. This work has been substantially completed, except for the final topographic surveys and property maps which can best be undertaken after the plan submitted herewith has been approved and property acquisitions definitely established.

On February 18, 1953 we submitted a tentative general plan, dated February 16, 1953, to Mr. Joseph K. Costello, who in turn submitted copies to Commissioner R. J. Abbott. We were advised that the general scheme of approaches and highway connections embodied in that plan was satisfactory.

The general scheme in the plans submitted herewith remains unaltered, but the East-West Bridge Approach from Black Horse Pike and Crescent Boulevard has been shifted somewhat to the north since borings indicated more favorable subsurface conditions at the new location.

Description of General Plan

In the immediate vicinity of the bridge approaches there are now existing two North-South arterial highways (See Plates 3 & 4), Crescent Boulevard and Black Horse Pike, and one east-west arterial highway, Nicholson Road. In addition the New Jersey Highway Department plans to construct a new artery, the North-South Freeway, which will cross the bridge approach near Newton Creek.

The approach plans have been developed so as to provide direct connections between the bridge and the aforementioned arterial facilities which will in turn serve as distributors to several other existing and proposed arterial highways in the larger area tributary to the bridge.

A traffic interchange located adjacent to Newton Creek at the intersection of the bridge approach and the Freeway provides for uninterrupted movements of bridge traffic to and from the North-South Freeway.

Bridge traffic to and from the south on Crescent Boulevard (State Route 130) will flow without interruption through a traffic interchange at the intersection of

the North-South Freeway and Crescent Boulevard.

The East-West Bridge Approach will provide direct connections for bridge traffic to and from the north on Crescent Boulevard and, via the latter, to and from the north on Black Horse Pike. This East-West Approach terminates with direct connections for bridge traffic to and from the south on Black Horse Pike.

Thus two separate systems of highway connections are provided in the proposed plan. This arrangement will permit bridge traffic to use those highways which are least crowded, thereby tending to prevent over-concentration of traffic on any feeder route.

The Interchange between the bridge and the North-South Freeway will accommodate bridge traffic to and from the New Jersey Turnpike and to and from the White Horse Pike (State Route 30) via the proposed North-South Freeway Connection to Route 30 (Proposed Route 60).

The East-West Bridge Approach connecting with Black Horse Pike will also serve bridge traffic to and from Nicholson Road, White Horse Pike and the New Jersey Turnpike. This East-West connection from the bridge to Black Horse Pike will also accommodate traffic, other than bridge traffic, between the North-South Freeway, Crescent Boulevard and the Black Horse Pike.

Local traffic between Camden and Gloucester will use Collings Road which is to be relocated to a position under the bridge approach structure with termination at Broadway in Gloucester.

Anticipated Traffic

The traffic flow diagram, Plate No. 13, which forms part of this report, indicates the anticipated average daily and the 30th highest peak hourly traffic volumes for 1957, the first year of bridge operation, and for 1978. These figures were compiled from studies made by Coverdale and Colpitts for bridge traffic and by the New Jersey Highway Department for highway traffic. The proposed plan with the two systems of approaches,

each of which will serve a portion of the same feeder roads, will tend to make the traffic more fluid and will prevent the over-loading of any single highway.

The anticipated traffic volumes indicate that at the time the bridge is opened to traffic a single approach system would tax to capacity the highways serving it. This would later prevent a normal increase in bridge traffic and overload the adjacent highways, placing a hardship on the neighboring areas.

All approach roads and ramps are designed so that they will have adequate capacity for the anticipated traffic for the year 1978.

A map entitled "New Jersey Approaches and Highway Connections to Delaware River Bridges, Philadelphia-Camden Area" (Plate No. 2) shows the present average daily traffic volumes over the existing Delaware River crossings and the expected average daily traffic at the time of the opening of the proposed new bridge.

Conditions at Site

With the exception of small areas adjacent to Collings Road and the crossings at Crescent Boulevard and Black Horse Pike of the East-West Bridge Approach, the proposed improvements are located in a tidal marsh which is frequently under water at high tide and, in its present state, is of little value to the bordering neighborhood. This project will tend to improve the area by reducing the amount of land subject to flooding and will undoubtedly encourage the development of part of the unused portion of this marsh for useful purposes.

The development of the site, as contemplated under this plan, includes the construction of approach roadways on extensive embankments, the relocation of portions of Newton Creek and its branches, the building of grade separation structures, bridges approach viaducts and stream bridges, and the landscaping of the areas adjacent to the roadways.

Highway Design

The design of this system of connecting highways and ramps is based on

the best practice of modern highway design as far as the restricted area and economy permit.

The width of the pavement on the main connecting roads is twelve feet for each traveled lane. The standards of the American Association of State Highway Officials were used in establishing the width of the ramps.

To secure maximum capacity at peak hours the connection for traffic to and from the south between the bridge and the North-South Freeway is designed to permit reversible traffic operation in conformity with the reversible traffic operation planned for the bridge proper.

The maximum rate of grade on the main approach arteries is three and one half percent and the maximum rate of grade on the ramps is five percent.

Bituminous concrete pavements are proposed for both the main approaches and the ramps.

It is also planned to provide highway lighting and overhead lighted direction signs where necessary.

Types of Structures and Foundations

On the direct approaches to the bridge and on the Interchange at the North-South Freeway, where the heights between the existing ground and the approach roadway are excessive for embankment construction, the roadways will be supported by multiple span viaducts of steel stringer construction as shown on Plate No.11. The construction of grade separation structures between the North-South Freeway and Collings Road, and between the East-West Bridge Approach and Crescent Boulevard and the Black Horse Pike will be three span stringer-type structures with a single span over the road, as illustrated on Plate No. 10. Stream structures will be multiple spans with concrete piers and abutments.

The foundation conditions are such that pile foundations are required to support all structures.

Embankment Design and Soil Stabilization

The foundation materials at the bridge site are primarily composed of sedimentary sands, clays, local gravel pockets, and alluvial deposits or organic muck.

An extensive subsurface investigation was made on the approaches. A total of thirty-two borings were recently completed and soils samples therefrom were tested in the laboratory. Similiar information which the New Jersey State Highway Department had prepared in connection with the proposed North-South Freeway was also made available to us. From these data it was possible to determine the character and extent of the organic muck deposits and thus select the most feasible and economical alignment of the approaches.

The organic muck and other soft soils encountered along the approaches and connecting highways were found to be from ten to thirty feet in depth. They will require special stabilization to avoid displacement during construction and excessive differential settlement subsequent to the completion of paving.

In some portions of the work, removal of the unsuitable foundation soil and replacing it with clean sand can be accomplished most economically. In other portions, where the muck deposits are of excessive depth to be removed economically and where the length of construction time permits, the use of sand drains and overload is planned for the stabilization of the embankments. Cost of construction and the degree of consolidation that may be obtained are directly related to the construction time available. Early start of work on this phase of the project is therefore important.

In connection with the studies for the soil stabilization we have had the valuable assistance and advice of the engineering firm of Porter-Urquhart & Beavin.

Estimated Costs

Certain portions of the approach system will be used jointly by bridge traffic and by traffic between local and state highways. At a meeting of representatives of the

New Jersey State Highway Department and of the Delaware River Port Authority on April 16, 1953, the following division of costs and work between the two agencies was discussed and it was decided that the Highway Department would prepare a draft of an agreement covering same. (See Plan on Plate No. 4).

Item No. 1 Work to be designed and built and cost to be borne by the Delaware River Port Authority:

(a) The East-West Bridge Approach and its connections with Black Horse Pike, Crescent Boulevard, and Collings Road, including all channel relocation required for the project.

(b) The connections between the bridge and the North-South Freeway. (For exception see 2-(a) below).

Item No. 2 Work to be designed and built by the Delaware River Port Authority, but the cost to be shared equally between the New Jersey State Highway Department and the Delaware River Port Authority:

(a) The Relocation of Collings Road and a portion of the connection from the east-bound Bridge Approach to the north-bound Freeway from Station BN 4+0 to BN 8+0.

(b) The junction of the north-bound Bridge Approach with the Freeway between Stations FN 202+0 and FN 209+0.

Item No. 3. Work to be designed and built by the Delaware River Port Authority and cost to be borne by the New Jersey State Highway Department:

The north-bound roadway of the North-South Freeway between Station FN 168+0 and Station FN 202+0 and the south-bound roadway of the North-South Freeway between Station FN 168+0 and Station FN 208+0, including their connections with Collings Road and with the East-West Bridge Approach; also the connecting ramp "WN" between the west-bound Bridge Approach and ramp "BN".

Item No. 4. Work to be designed and build by the New Jersey State Highway Department, but the cost to be shared equally between the New Jersey State Highway Department and the Delaware River Port Authority:

(a) The North-South Freeway Between Station FN 209+0 and Station FN 235+0.

(b) The widening of Nicholson Road for a distance of approximately 1800 feet east of Black Horse Pike, the widening of Black Horse Pike from Nicholson Road to a point approximately 100 feet north of the East-West Bridge Approach overpass, and the channelization of the Nicholson Road-Black Horse Pike intersection.

At the aforementioned meeting on April 16, 1953 it was also agreed that the design and the supervision of construction of the work to be built by the Delaware River Port Authority will be done by the Authority's Engineers, Modjeski & Masters - Ammann & Whitney.

The New Jersey State Highway Department will also agree to prepare the necessary property acquisition maps and handle the right-of-way negotiations for all property east of the main line of the Pennsylvania-Reading Seashore Lines between Camden and Gloucester.

The estimated costs of the above named items of work exclusive of the portions on viaduct paid for by the Delaware River Port Authority, are tabulated as follows:

ESTIMATED COSTS

CONSTRUCTION	Total	Delaware River Port Authority Share	N.J. State Hwy. Dept. Share
Item No. 1 (a)	$ 4,438,000	$ 4,438,000	$ -
Item No. 1 (b)	599,000	599,000	-
Item No. 2 (a)	1,296,000	648,000	648,000
Item No. 2 (b)	440,000	220,000	220,000
Item No. 3	3,451,000	-	3,451,000
Item No. 4 (a)	1,844,000	922,000	922,000
Item No. 4 (b)	352,000	176,000	176,000
Total	12,420,000	7,003,000	5,417,000
15% Contingencies	1,863,000	1,050,000	813,000
	14,283,000	8,053,000	6,230,000
Salvage of Overload Fill	175,000	67,000	108,000
Total Construction	14,108,000	7,986,000	6,122,000
RIGHT OF WAY			
Item No. 1 (a)	$ 155,000	$ 155,000	$ -
Item No. 1 (b)	50,000	50,000	-
Item No. 2 (a)	2,000	1,000	1,000
Item No. 2 (b)	10,000	5,000	5,000
Item No. 3	200,000	-	200,000
Item No. 4 (a)	240,000	120,000	120,000
Item No. 4 (b)	50,000	25,000	25,000
Total Right of Way, inclusive of contingencies	707,000	356,000	351,000
ENGINEERING and ADMINISTRATION (7-1/2% of Construction)	1,058,000	599,000	459,000
GRAND TOTAL	$ 15,873,000	$ 8,941,000	$ 6,932,000

Conclusions and Recommendations

We believe that the plan submitted herewith will serve traffic to and from the bridge and on the connecting highways adequately for the foreseeable future and we therefore recommend its adoption.

Anticipated scheduled completion and opening to traffic of the bridge by January 1, 1957, make it essential that the proposed approaches and highway connections be ready for traffic on or before that date. Since considerable time has to be allowed for the soil stabilization and consolidation of fills for the embankment portions in the marsh area it is important to proceed with the acquisition of properties, the preparation of final plans, and the letting of construction contracts as soon as possible.

A list of illustrations is appended hereto.

Respectfully submitted,

Ammann & Whitney

By O. H. Ammann

OHA/hs

ILLUSTRATIONS

PLATE NO.	TITLE
1	Architectural Rendering: New Jersey Approach to Delaware River Bridge between Packer Avenue, Philadelphia and Gloucester, New Jersey.
2	Map: Philadelphia-Camden Area
3	General Plan
4	Plan of Approaches
5-8	Profiles
9	Typical Sections of Roadways and Embankments
10	Grade Separation Structure between Black Horse Pike and the East-West Bridge Approach.
11	East Bound East-West Bridge Approach over North-South Freeway
12 and 12A	Soil Profiles
13	Traffic Flow Map

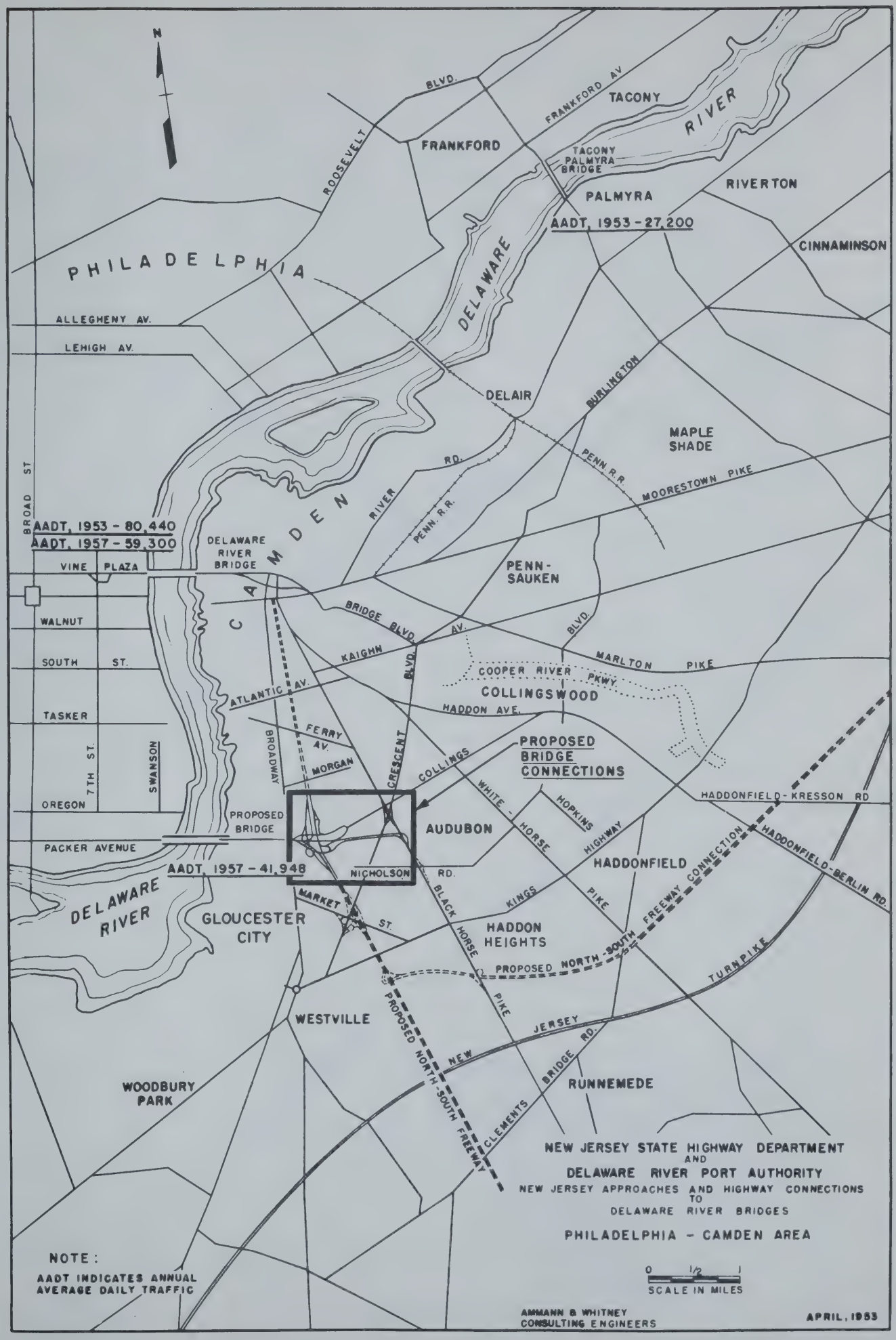

N
BLVD.
FRANKFORD AV
TACONY
RIVER
FRANKFORD
ROOSEVELT
TACONY PALMYRA BRIDGE
PALMYRA
RIVERTON
AADT, 1953 - 27,200
CINNAMINSON
PHILADELPHIA
DELAWARE
ALLEGHENY AV.
LEHIGH AV.
DELAIR
BURLINGTON
MAPLE SHADE
RD.
PENN. R.R.
MOORESTOWN PIKE
BROAD ST
AADT, 1953 - 80,440
AADT, 1957 - 59,300
CAMDEN
RIVER
PENN. R.R.
DELAWARE RIVER BRIDGE
VINE
PLAZA
PENN-SAUKEN
BRIDGE BLVD.
AV.
BLVD.
WALNUT
SOUTH
ST.
KAIGHN
MARLTON PIKE
COOPER RIVER PKWY.
ATLANTIC AV.
BLVD.
COLLINGSWOOD
HADDON AVE.
TASKER
7TH ST.
SWANSON
BROADWAY
FERRY AV.
MORGAN
CRESCENT
COLLINGS
PROPOSED BRIDGE CONNECTIONS
OREGON
PROPOSED BRIDGE
WHITE - HORSE
HOPKINS
HIGHWAY
HADDONFIELD - KRESSON RD
AUDUBON
PACKER AVENUE
HADDONFIELD
HADDONFIELD - BERLIN RD.
AADT, 1957 - 41,948
NICHOLSON
RD.
FREEWAY CONNECTION
DELAWARE RIVER
MARKET
ST.
GLOUCESTER CITY
BLACK HORSE
KINGS
PIKE
HADDON HEIGHTS
PROPOSED NORTH - SOUTH
TURNPIKE
WESTVILLE
PIKE
JERSEY
NEW
BRIDGE RD.
PROPOSED NORTH-SOUTH FREEWAY
WOODBURY PARK
RUNNEMEDE
CLEMENTS
NEW JERSEY STATE HIGHWAY DEPARTMENT
AND
DELAWARE RIVER PORT AUTHORITY
NEW JERSEY APPROACHES AND HIGHWAY CONNECTIONS
TO
DELAWARE RIVER BRIDGES
PHILADELPHIA - CAMDEN AREA
NOTE:
AADT INDICATES ANNUAL AVERAGE DAILY TRAFFIC
0 1/2 1
SCALE IN MILES
AMMANN & WHITNEY
CONSULTING ENGINEERS
APRIL, 1953

Plate 2

NEW JERSEY STATE HIGHWAY DEPARTMENT
AND
DELAWARE RIVER PORT AUTHORITY
NEW JERSEY APPROACHES AND HIGHWAY CONNECTIONS
TO
DELAWARE RIVER BRIDGE
CONNECTING
PACKER AVE., PHILADELPHIA, PA.
AND GLOUCESTER, N.J.

GENERAL PLAN

0 200 400 600 800 1000
SCALE IN FEET

AMMANN & WHITNEY
CONSULTING ENGINEERS

APRIL, 1953

NEW JERSEY STATE HIGHWAY DEPARTMENT
AND
DELAWARE RIVER PORT AUTHORITY
NEW JERSEY APPROACHES AND HIGHWAY CONNECTIONS
TO
DELAWARE RIVER BRIDGE
CONNECTING
PACKER AVE., PHILADELPHIA, PA.
AND GLOUCESTER, N.J.

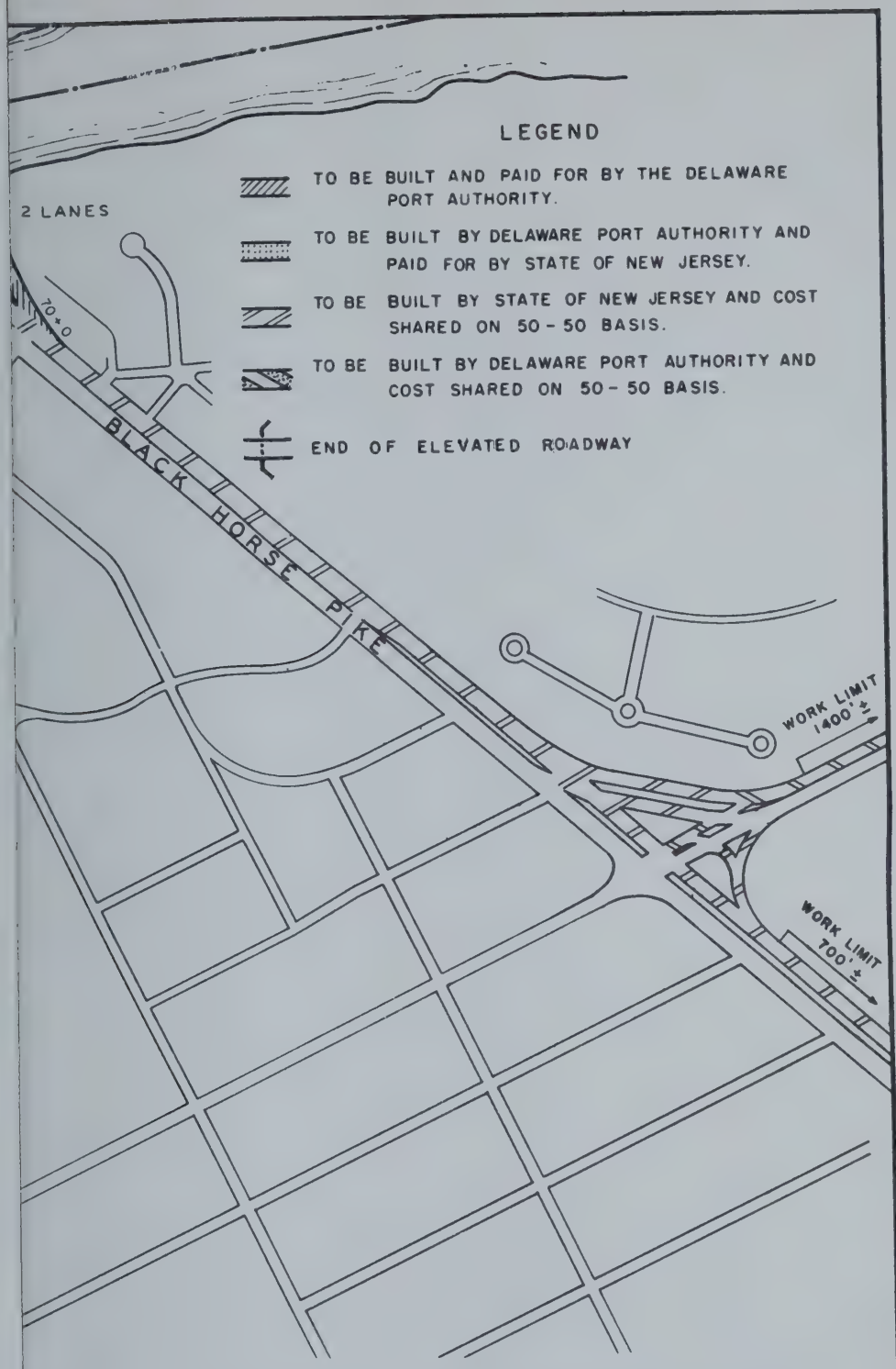
GENERAL PLAN

0 200 400 600 800 1000
SCALE IN FEET

AMMANN & WHITNEY
CONSULTING ENGINEERS

APRIL, 1953

Plate 3


LEGEND
TO BE BUILT AND PAID FOR BY THE DELAWARE PORT AUTHORITY.
TO BE BUILT BY DELAWARE PORT AUTHORITY AND PAID FOR BY STATE OF NEW JERSEY.
TO BE BUILT BY STATE OF NEW JERSEY AND COST SHARED ON 50 - 50 BASIS.
TO BE BUILT BY DELAWARE PORT AUTHORITY AND COST SHARED ON 50 - 50 BASIS.
END OF ELEVATED ROADWAY
2 LANES
70+0
BLACK HORSE PIKE
WORK LIMIT 1400' ±
WORK LIMIT 700' ±

NEW JERSEY STATE HIGHWAY DEPARTMENT
AND
DELAWARE RIVER PORT AUTHORITY
NEW JERSEY APPROACHES AND HIGHWAY CONNECTIONS
TO
DELAWARE RIVER BRIDGE
CONNECTING
PACKER AVE., PHILADELPHIA, PA.
AND GLOUCESTER, N.J.
PLAN OF APPROACHES

0 100 200 400 600
SCALE IN FEET

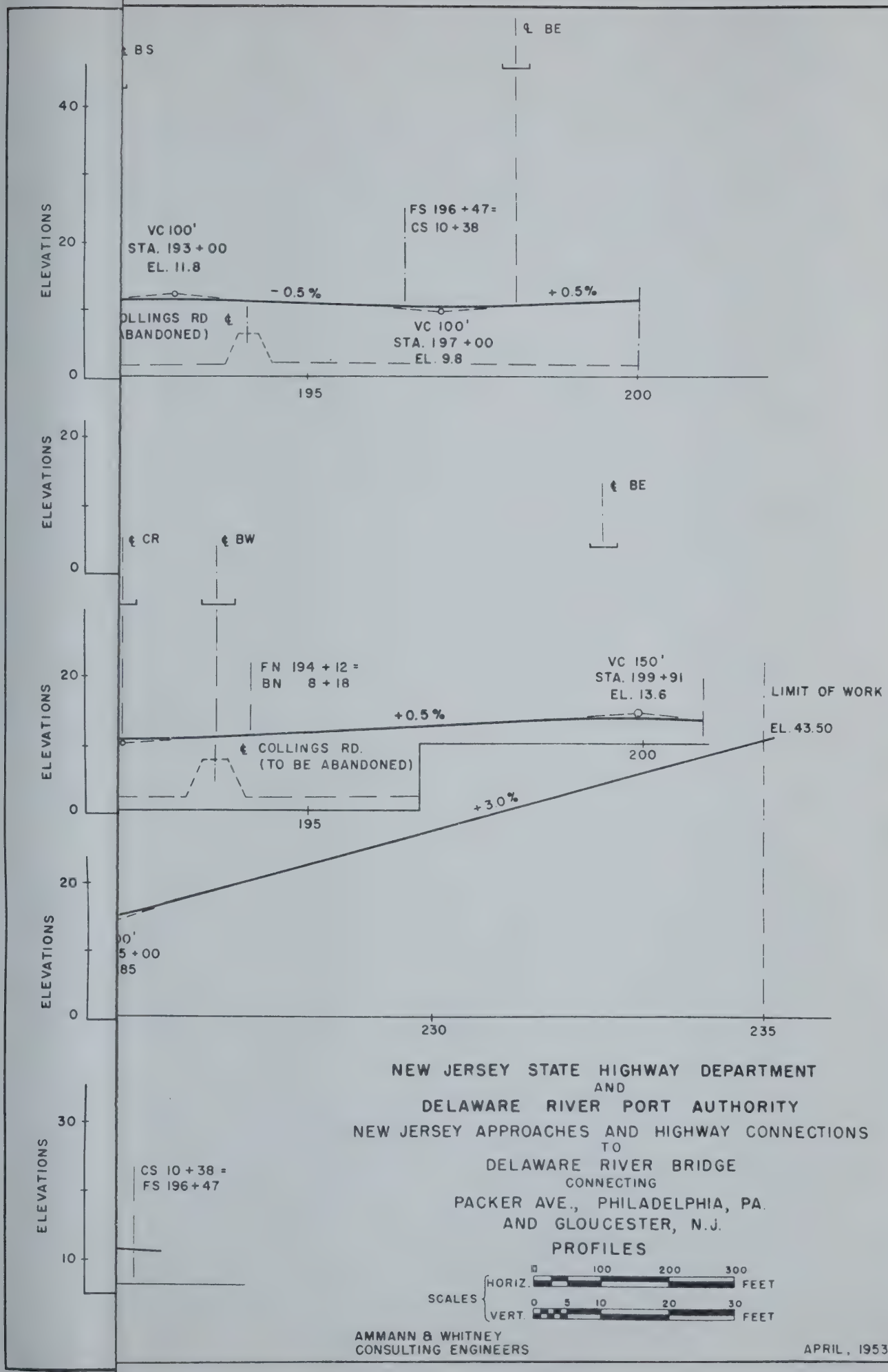
AMMANN & WHITNEY
CONSULTING ENGINEERS

APRIL, 1953

Plate 4

MATCH LINE A
PROP NORTH-SOUTH FREEWAY
SOUTH BRANCH
LIMIT OF WORK
KLEM AVE
BLVD
HIGHLAND
CAMDEN
NEWTON
CREEK
NORTH BRANCH
LIMIT OF WORK
STA FN 168+0
TRENT
NIAGARA
IRONSIDE
MONITOR
KEARSARGE AVE
YORKSHIP SQUARE
COLLINGS ROAD
EAST-WEST BRIDGE APPROACH
CRESCENT BLVD
HADDON
MAIN BRANCH
BLACK HORSE PIKE
WORK LIMIT 1400'±
WORK LIMIT 700'±
PENNA READING SEASHORE LINES
BROADWAY
RELOCATION OF PENNA READING SEASHORE LINES
COLLINGS ROAD
DELAWARE RIVER
BRIDGE ANCHORAGE
BRIDGE TOWER
PROPOSED DELAWARE RIVER BRIDGE
PACKER AVE., PHILADELPHIA, PA
GLOUCESTER, N.J.
GLOUCESTER
ESSEX ST
MORRIS ST
PROPOSED NORTH-SOUTH FREEWAY
STA FN 209+0
LEHIGH AVE
HARVARD
OXFORD
PRINCETON
YALE
NICHOLSON ROAD
ROUTE 130
FOR CONTINUATION SEE MATCH LINE A IN INSERT
LEGEND
TO BE BUILT AND PAID FOR BY THE DELAWARE PORT AUTHORITY
TO BE BUILT BY DELAWARE PORT AUTHORITY AND PAID FOR BY STATE OF NEW JERSEY
TO BE BUILT BY STATE OF NEW JERSEY AND COST SHARED ON 50 - 50 BASIS.
TO BE BUILT BY DELAWARE PORT AUTHORITY AND COST SHARED ON 50 - 50 BASIS
END OF ELEVATED ROADWAY
NOTE:-
LETTERS THUS, CBW DESIGNATE THE VARIOUS CONNECTIONS AND RAMPS ON PLAN AND PROFILES. THEY GENERALLY INDICATE ROAD OF ORIGIN AND DIRECTION OF TRAFFIC.
FOR EXAMPLE:-
FN=FREEWAY TRAFFIC NORTHBOUND
BS=BRIDGE TRAFFIC SOUTHBOUND
CBW=CRESCENT BLVD. WESTBOUND
NEW JERSEY STATE HIGHWAY DEPARTMENT
AND
DELAWARE RIVER PORT AUTHORITY
NEW JERSEY APPROACHES AND HIGHWAY CONNECTIONS
TO
DELAWARE RIVER BRIDGE
CONNECTING
PACKER AVE., PHILADELPHIA, PA.
AND GLOUCESTER, N.J.
PLAN OF APPROACHES
0 100 200 400 600
SCALE IN FEET
AMMANN & WHITNEY
CONSULTING ENGINEERS
APRIL, 1953

Plate 4



NEW JERSEY STATE HIGHWAY DEPARTMENT
AND
DELAWARE RIVER PORT AUTHORITY

NEW JERSEY APPROACHES AND HIGHWAY CONNECTIONS
TO
DELAWARE RIVER BRIDGE
CONNECTING
PACKER AVE., PHILADELPHIA, PA.
AND GLOUCESTER, N.J.

PROFILES

SCALES { HORIZ. 0 100 200 300 FEET
VERT. 0 5 10 20 30 FEET

AMMANN & WHITNEY
CONSULTING ENGINEERS

APRIL, 1953

Plate 5

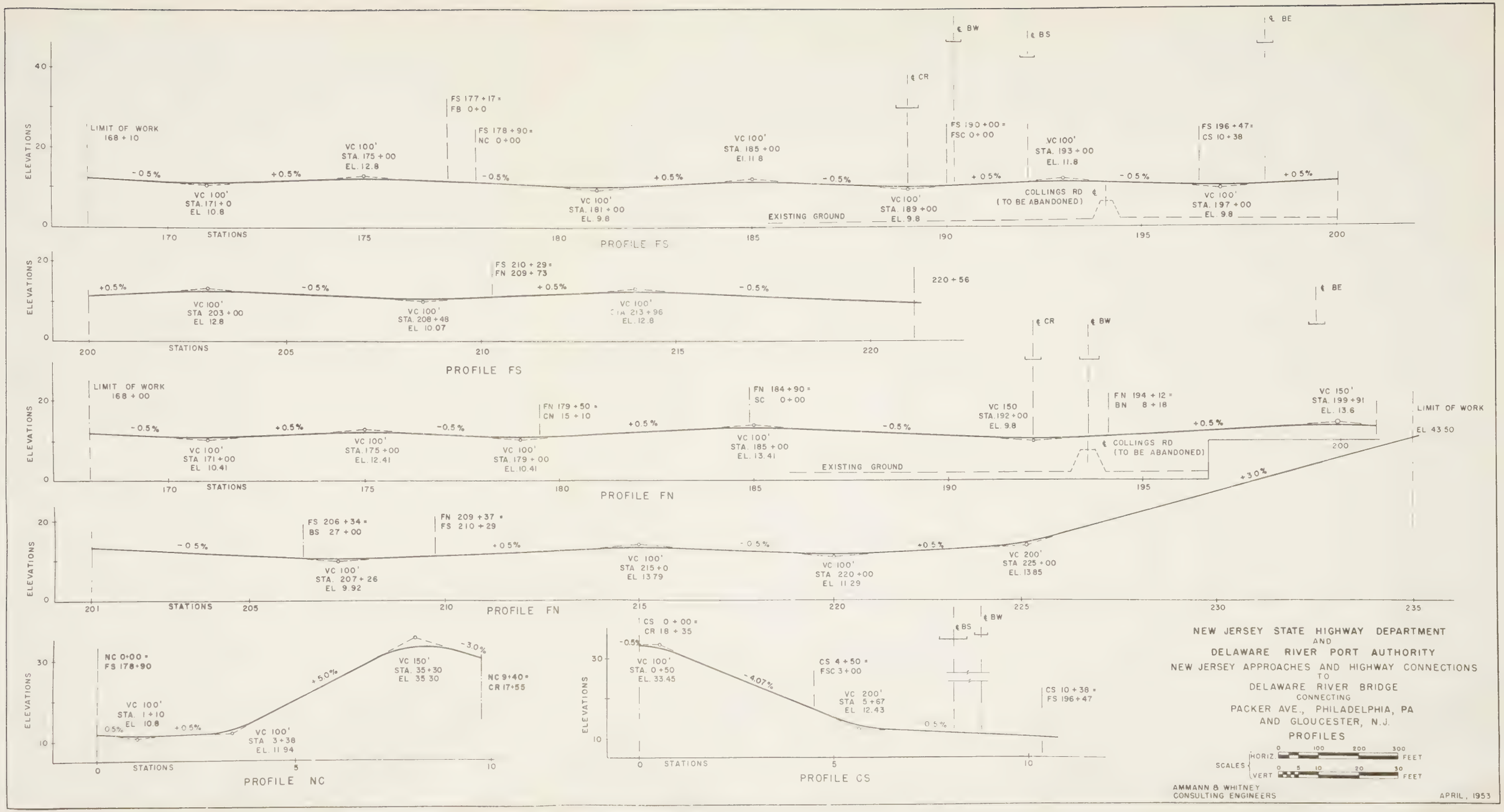
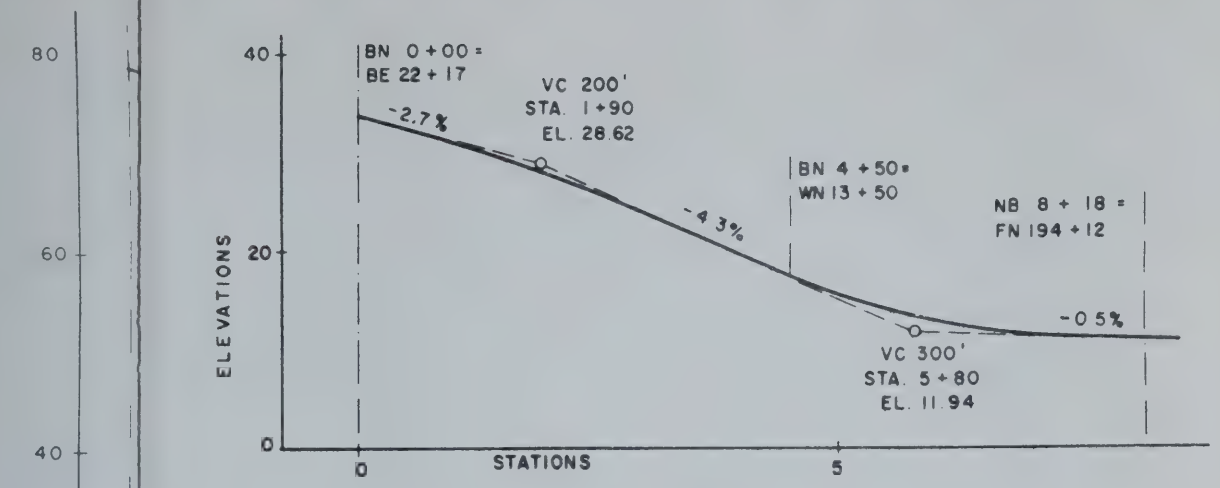
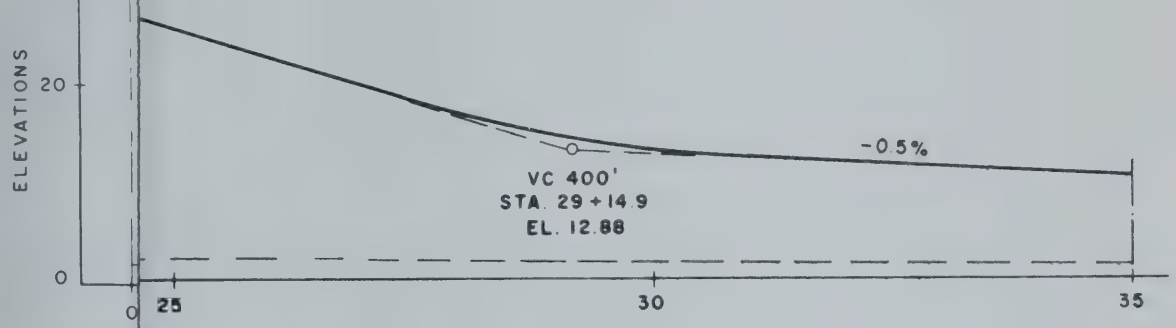
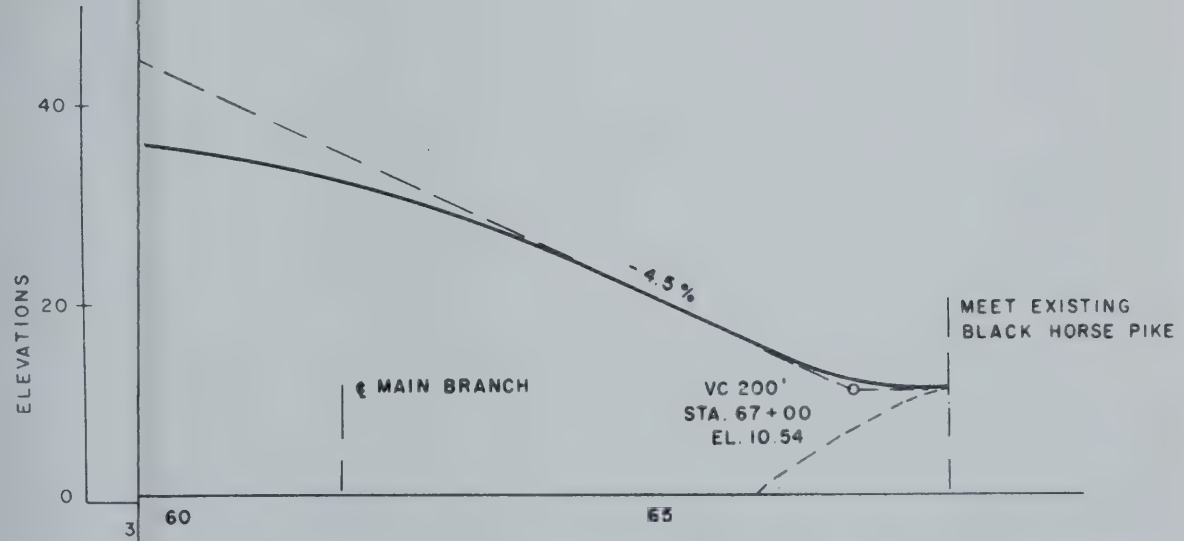

PROFILE FS
LIMIT OF WORK 168 + 10
VC 100' STA. 171 + 0 EL 10.8
VC 100' STA. 175 + 00 EL. 12.8
FS 177 + 17 = FB 0 + 0
FS 178 + 90 = NC 0 + 00
VC 100' STA. 181 + 00 EL. 9.8
VC 100' STA. 185 + 00 EL. 11.8
℄ CR
℄ BW
℄ BS
℄ BE
FS 190 + 00 = FSC 0 + 00
VC 100' STA. 189 + 00 EL. 9.8
VC 100' STA. 193 + 00 EL. 11.8
COLLINGS RD ℄ (TO BE ABANDONED)
FS 196 + 47 = CS 10 + 38
VC 100' STA. 197 + 00 EL. 9.8
EXISTING GROUND
ELEVATIONS
STATIONS
PROFILE FS
VC 100' STA 203 + 00 EL 12.8
VC 100' STA. 208 + 48 EL 10.07
FS 210 + 29 = FN 209 + 73
VC 100' STA 213 + 96 EL. 12.8
220 + 56
PROFILE FN
LIMIT OF WORK 168 + 00
VC 100' STA 171 + 00 EL 10.41
VC 100' STA. 175 + 00 EL. 12.41
FN 179 + 50 = CN 15 + 10
VC 100' STA. 179 + 00 EL. 10.41
FN 184 + 90 = SC 0 + 00
VC 100' STA. 185 + 00 EL. 13.41
VC 150 STA. 192 + 00 EL. 9.8
FN 194 + 12 = BN 8 + 18
VC 150' STA. 199 + 91 EL. 13.6
℄ COLLINGS RD (TO BE ABANDONED)
LIMIT OF WORK EL 43.50
+30%
PROFILE FN
FS 206 + 34 = BS 27 + 00
FN 209 + 37 = FS 210 + 29
VC 100' STA. 207 + 26 EL 9.92
VC 100' STA 215 + 0 EL 13.79
VC 100' STA 220 + 00 EL 11.29
VC 200' STA 225 + 00 EL 13.85
PROFILE NC
NC 0+00 = FS 178+90
VC 100' STA. 1 + 10 EL 10.8
VC 100' STA 3 + 38 EL. 11.94
VC 150' STA. 35 + 30 EL 35 30
NC 9+40 = CR 17+55
+5.0%
-3.0%
PROFILE CS
CS 0 + 00 = CR 18 + 35
VC 100' STA. 0 + 50 EL. 33.45
CS 4 + 50 = FSC 3 + 00
VC 200' STA 5 + 67 EL 12.43
CS 10 + 38 = FS 196 + 47
-4.07%
NEW JERSEY STATE HIGHWAY DEPARTMENT
AND
DELAWARE RIVER PORT AUTHORITY
NEW JERSEY APPROACHES AND HIGHWAY CONNECTIONS
TO
DELAWARE RIVER BRIDGE
CONNECTING
PACKER AVE., PHILADELPHIA, PA
AND GLOUCESTER, N.J.
PROFILES
SCALES HORIZ 0 100 200 300 FEET
VERT 0 5 10 20 30 FEET
AMMANN & WHITNEY
CONSULTING ENGINEERS
APRIL, 1953

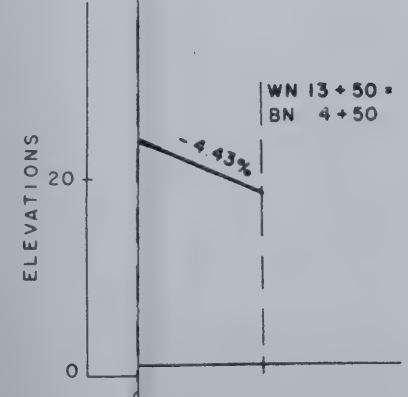
Plate 5



PROFILE BN







NEW JERSEY STATE HIGHWAY DEPARTMENT
AND
DELAWARE RIVER PORT AUTHORITY

NEW JERSEY APPROACHES AND HIGHWAY CONNECTIONS
TO
DELAWARE RIVER BRIDGE
CONNECTING
PACKER AVE., PHILADELPHIA, PA.
AND GLOUCESTER, N.J.

PROFILES

SCALES { HORIZ. 0 100 200 300 FEET
VERT. 0 5 10 20 30 FEET

AMMANN & WHITNEY
CONSULTING ENGINEERS

APRIL, 1953

Plate 6

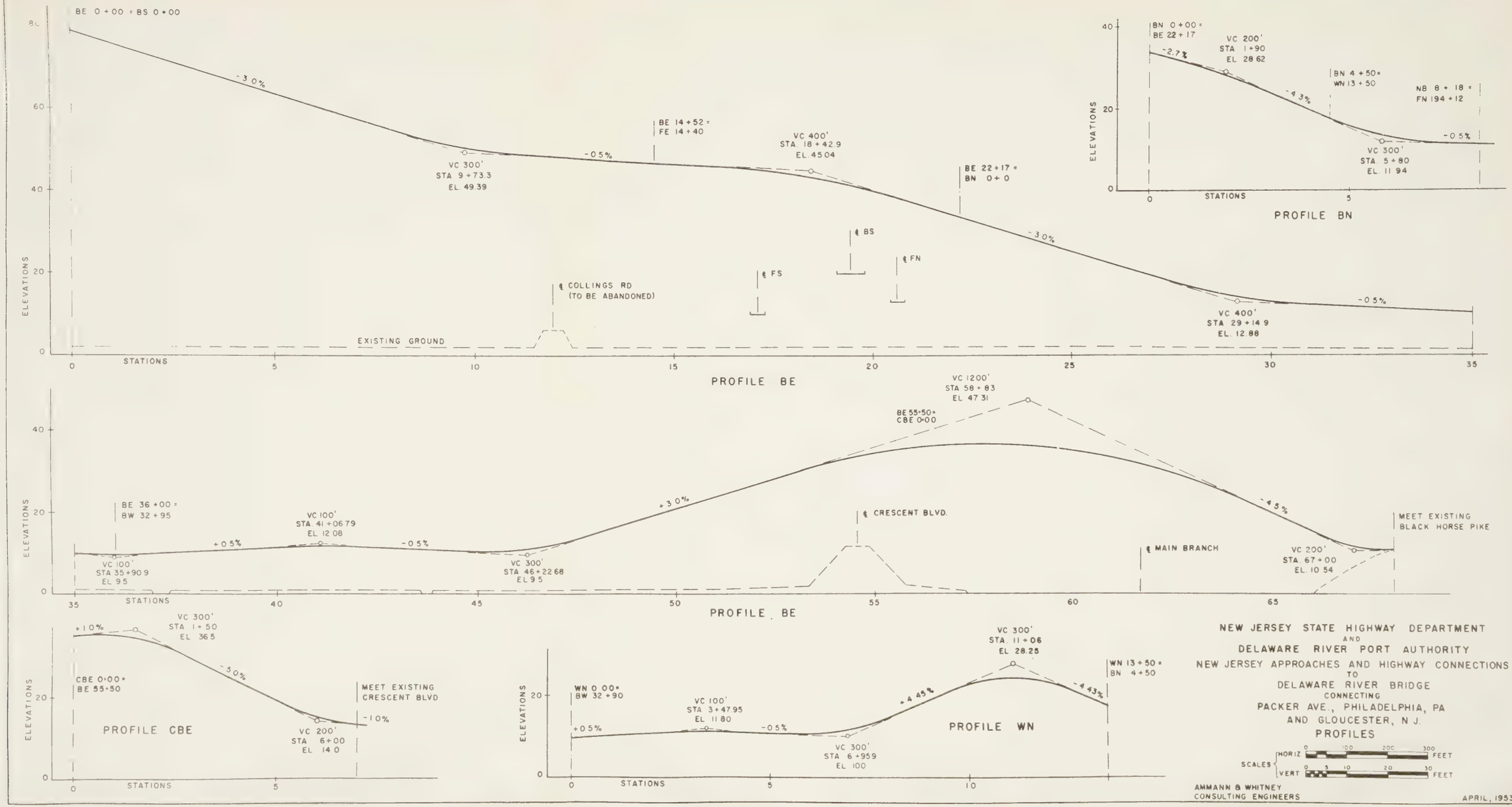

BE 0+00 = BS 0+00
-3.0%
VC 300'
STA 9+73.3
EL. 49.39
-0.5%
BE 14+52 =
FE 14+40
VC 400'
STA. 18+42.9
EL. 45.04
BE 22+17 =
BN 0+0
-3.0%
-0.5%
VC 400'
STA 29+14.9
EL. 12.88
℄ BS
℄ FN
℄ FS
℄ COLLINGS RD
(TO BE ABANDONED)
EXISTING GROUND
ELEVATIONS
STATIONS
PROFILE BE
BN 0+00 =
BE 22+17
-2.7%
VC 200'
STA 1+90
EL 28.62
BN 4+50=
WN 13+50
-4.3%
NB 8+18 =
FN 194+12
-0.5%
VC 300'
STA. 5+80
EL. 11.94
PROFILE BN
VC 1200'
STA 58+83
EL 47.31
BE 55+50=
CBE 0+00
BE 36+00 =
BW 32+95
VC 100'
STA 35+90.9
EL 9.5
+0.5%
VC 100'
STA. 41+06.79
EL 12.08
-0.5%
VC 300'
STA 46+22.68
EL 9.5
+3.0%
-4.5%
℄ CRESCENT BLVD.
℄ MAIN BRANCH
MEET EXISTING
BLACK HORSE PIKE
VC 200'
STA. 67+00
EL. 10.54
PROFILE BE
+1.0%
VC 300'
STA 1+50
EL 36.5
CBE 0+00 =
BE 55+50
-5.0%
MEET EXISTING
CRESCENT BLVD
-1.0%
VC 200'
STA 6+00
EL 14.0
PROFILE CBE
WN 0.00=
BW 32+90
+0.5%
VC 100'
STA 3+47.95
EL 11.80
-0.5%
VC 300'
STA 6+95.9
EL 10.0
+4.45%
VC 300'
STA. 11+06
EL 28.25
-4.43%
WN 13+50 =
BN 4+50
PROFILE WN
NEW JERSEY STATE HIGHWAY DEPARTMENT
AND
DELAWARE RIVER PORT AUTHORITY
NEW JERSEY APPROACHES AND HIGHWAY CONNECTIONS
TO
DELAWARE RIVER BRIDGE
CONNECTING
PACKER AVE., PHILADELPHIA, PA
AND GLOUCESTER, N.J.
PROFILES
SCALES HORIZ 0 100 200 300 FEET
VERT 0 5 10 20 30 FEET
AMMANN & WHITNEY
CONSULTING ENGINEERS
APRIL, 1953

Plate 6

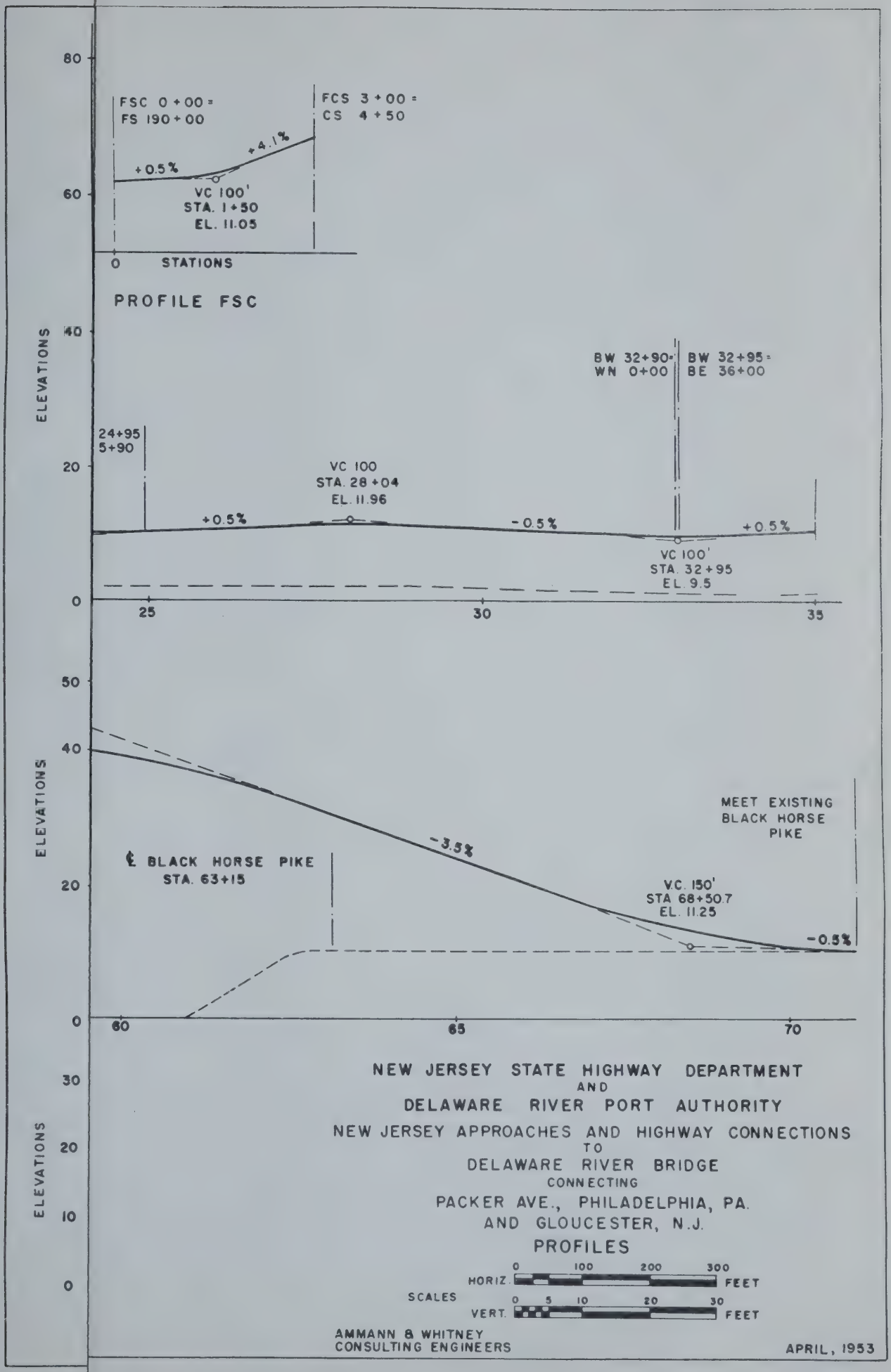
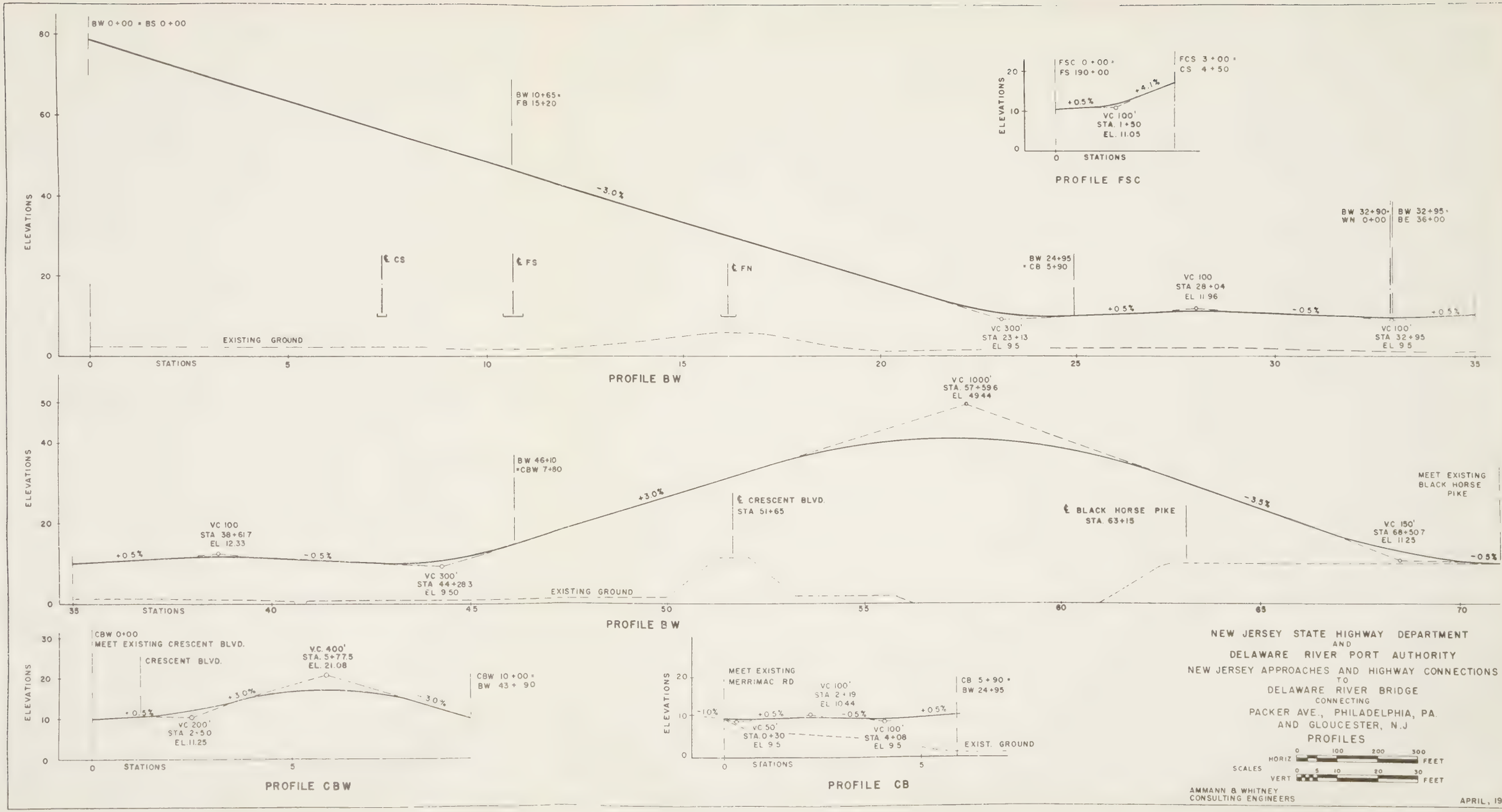

FSC 0+00 = FS 190+00
FCS 3+00 = CS 4+50
+0.5%
+4.1%
VC 100'
STA. 1+50
EL. 11.05
0 STATIONS
PROFILE FSC
ELEVATIONS
80
60
40
20
0
BW 32+90 = WN 0+00
BW 32+95 = BE 36+00
24+95
5+90
VC 100
STA. 28+04
EL. 11.96
+0.5%
-0.5%
+0.5%
VC 100'
STA. 32+95
EL. 9.5
25
30
35
50
40
20
0
MEET EXISTING BLACK HORSE PIKE
-3.5%
℄ BLACK HORSE PIKE
STA. 63+15
V.C. 150'
STA 68+50.7
EL. 11.25
-0.5%
60
65
70
30
20
10
0
NEW JERSEY STATE HIGHWAY DEPARTMENT
AND
DELAWARE RIVER PORT AUTHORITY
NEW JERSEY APPROACHES AND HIGHWAY CONNECTIONS
TO
DELAWARE RIVER BRIDGE
CONNECTING
PACKER AVE., PHILADELPHIA, PA.
AND GLOUCESTER, N.J.
PROFILES
SCALES
HORIZ. 0 100 200 300 FEET
VERT. 0 5 10 20 30 FEET
AMMANN & WHITNEY
CONSULTING ENGINEERS
APRIL, 1953

Plate 7


BW 0+00 = BS 0+00
BW 10+65 = FB 15+20
-3.0%
℄ CS
℄ FS
℄ FN
BW 24+95 = CB 5+90
VC 300' STA 23+13 EL 9.5
+0.5%
VC 100 STA 28+04 EL 11.96
-0.5%
BW 32+90 = WN 0+00
BW 32+95 = BE 36+00
VC 100' STA 32+95 EL 9.5
+0.5%
EXISTING GROUND
ELEVATIONS
STATIONS
PROFILE BW
FSC 0+00 = FS 190+00
FCS 3+00 = CS 4+50
+0.5%
+4.1%
VC 100' STA. 1+50 EL. 11.05
PROFILE FSC
VC 1000' STA. 57+59.6 EL 49.44
BW 46+10 = CBW 7+80
+3.0%
℄ CRESCENT BLVD. STA 51+65
℄ BLACK HORSE PIKE STA. 63+15
-3.5%
MEET EXISTING BLACK HORSE PIKE
VC 150' STA 68+50.7 EL 11.25
-0.5%
VC 100 STA 38+61.7 EL 12.33
+0.5%
-0.5%
VC 300' STA 44+28.3 EL 9.50
EXISTING GROUND
ELEVATIONS
STATIONS
PROFILE BW
CBW 0+00 MEET EXISTING CRESCENT BLVD.
CRESCENT BLVD.
V.C. 400' STA. 5+77.5 EL. 21.08
+0.5%
+3.0%
-3.0%
VC 200' STA 2+50 EL 11.25
CBW 10+00 = BW 43+90
ELEVATIONS
STATIONS
PROFILE CBW
MEET EXISTING MERRIMAC RD
-1.0%
+0.5%
VC 100' STA 2+19 EL 10.44
-0.5%
+0.5%
CB 5+90 = BW 24+95
VC 50' STA 0+30 EL 9.5
VC 100' STA 4+08 EL 9.5
EXIST. GROUND
ELEVATIONS
STATIONS
PROFILE CB
NEW JERSEY STATE HIGHWAY DEPARTMENT
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NEW JERSEY APPROACHES AND HIGHWAY CONNECTIONS
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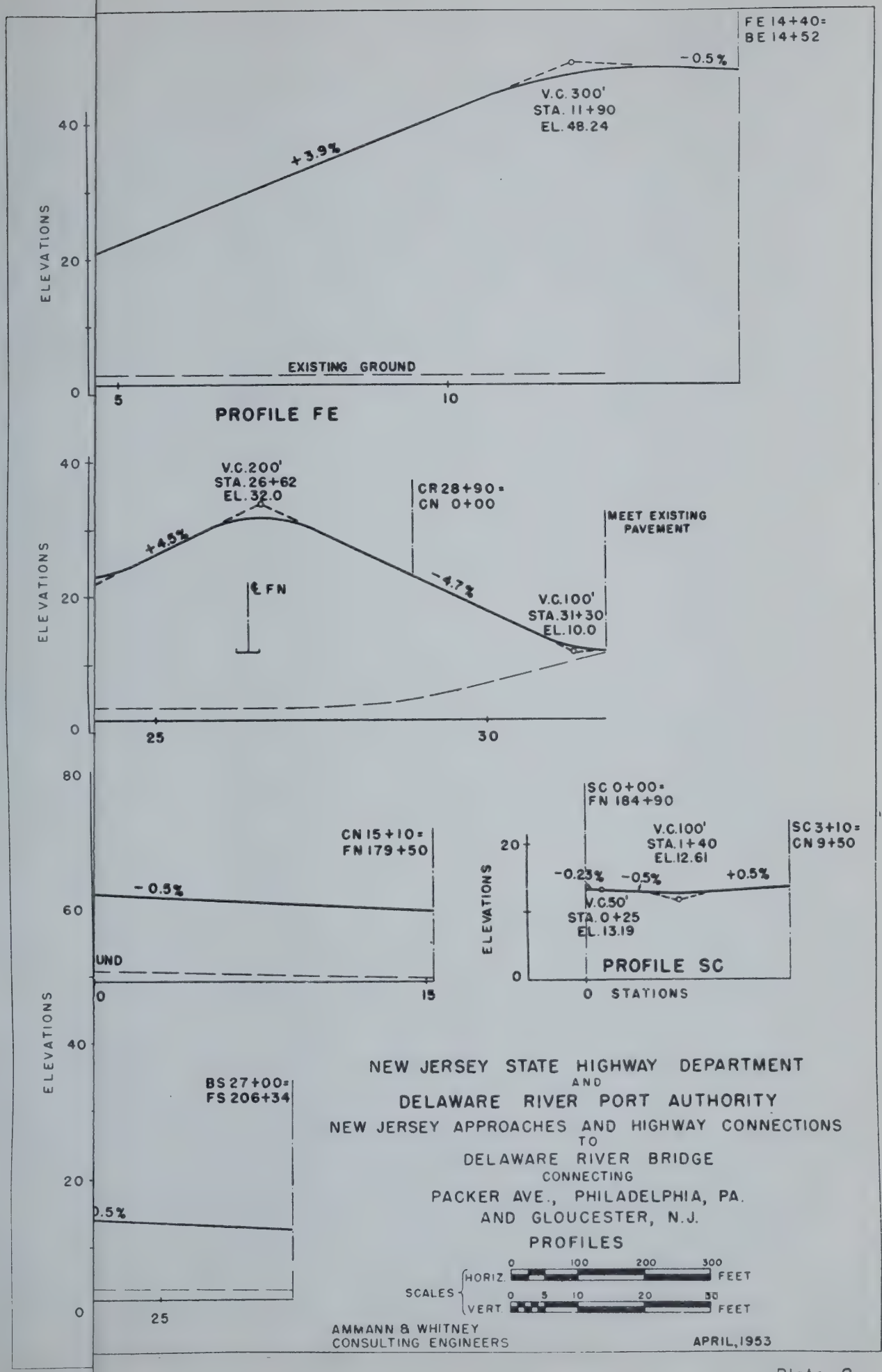
AND GLOUCESTER, N.J.
PROFILES
SCALES
HORIZ 0 100 200 300 FEET
VERT 0 5 10 20 30 FEET
AMMANN & WHITNEY
CONSULTING ENGINEERS
APRIL, 1953

Plate 7


FE 14+40=
BE 14+52
-0.5%
V.C. 300'
STA. 11+90
EL. 48.24
+3.9%
ELEVATIONS
40
20
0
EXISTING GROUND
5
10
PROFILE FE
V.C.200'
STA.26+62
EL. 32.0
CR 28+90=
CN 0+00
MEET EXISTING
PAVEMENT
+4.5%
-4.7%
℄ FN
V.C.100'
STA.31+30
EL.10.0
25
30
80
60
CN 15+10=
FN 179+50
-0.5%
UND
0
15
SC 0+00=
FN 184+90
V.C.100'
STA.1+40
EL.12.61
SC 3+10=
CN 9+50
-0.23%
-0.5%
+0.5%
V.C.50'
STA. 0+25
EL. 13.19
PROFILE SC
STATIONS
BS 27+00=
FS 206+34
0.5%
25
NEW JERSEY STATE HIGHWAY DEPARTMENT
AND
DELAWARE RIVER PORT AUTHORITY
NEW JERSEY APPROACHES AND HIGHWAY CONNECTIONS
TO
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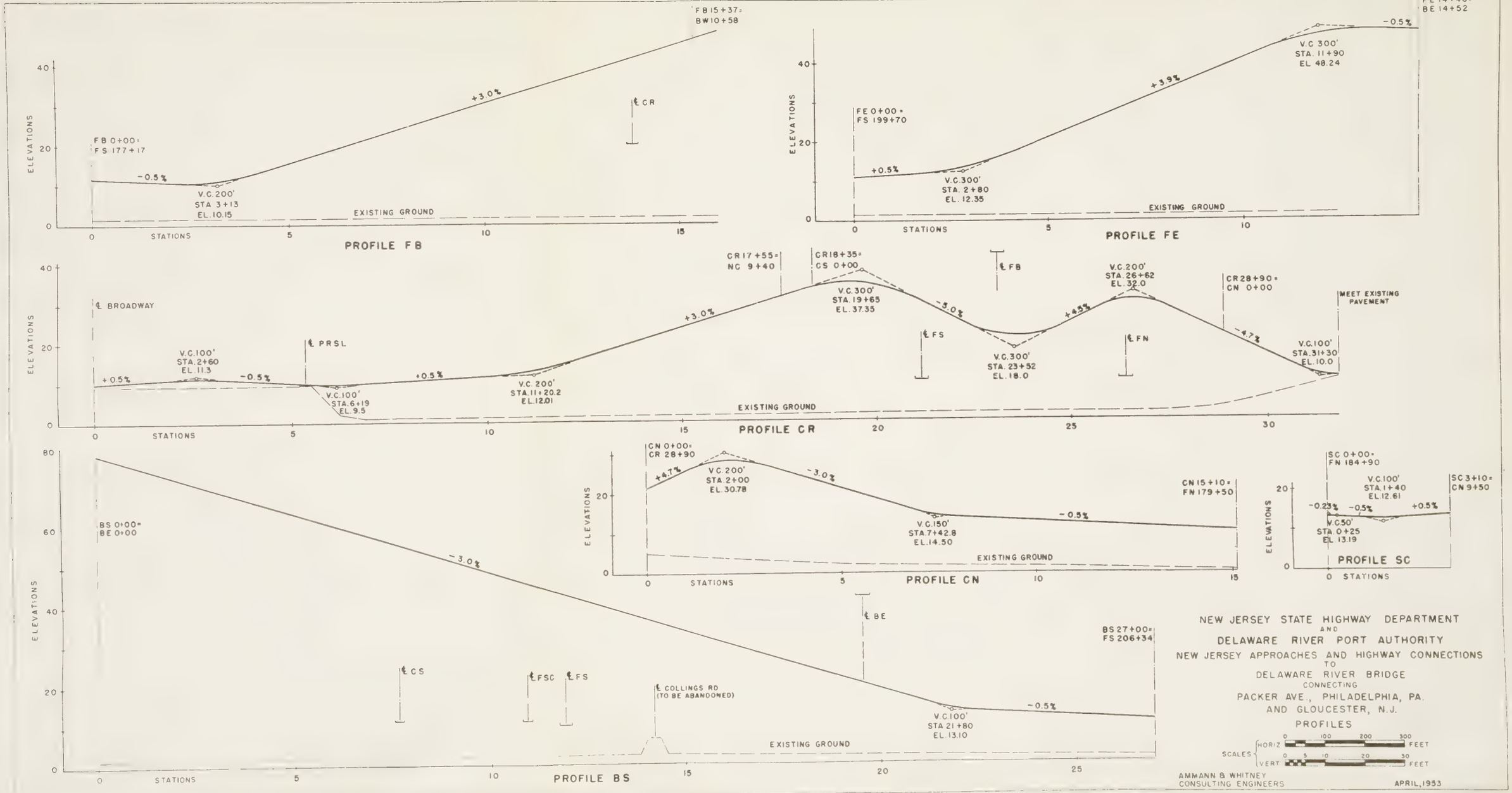
CONNECTING
PACKER AVE., PHILADELPHIA, PA.
AND GLOUCESTER, N.J.
PROFILES
SCALES
HORIZ. 0 100 200 300 FEET
VERT. 0 5 10 20 30 FEET
AMMANN & WHITNEY
CONSULTING ENGINEERS
APRIL, 1953

Plate 8


FB 15+37 = BW 10+58
FB 0+00 = FS 177+17
-0.5%
V.C. 200' STA 3+13 EL. 10.15
+3.0%
℄ CR
EXISTING GROUND
ELEVATIONS
STATIONS
PROFILE FB
FE 14+40 = BE 14+52
FE 0+00 = FS 199+70
+0.5%
V.C. 300' STA. 2+80 EL. 12.35
+3.9%
V.C 300' STA. 11+90 EL 48.24
-0.5%
PROFILE FE
℄ BROADWAY
V.C. 100' STA. 2+60 EL. 11.3
℄ PRSL
V.C. 100' STA. 6+19 EL. 9.5
V.C. 200' STA. 11+20.2 EL. 12.01
CR 17+55 = NC 9+40
CR 18+35 = CS 0+00
V.C. 300' STA. 19+65 EL. 37.35
℄ FB
-3.0%
V.C. 300' STA. 23+52 EL. 18.0
℄ FS
℄ FN
+4.3%
V.C. 200' STA. 26+62 EL. 32.0
CR 28+90 = CN 0+00
-4.7%
MEET EXISTING PAVEMENT
V.C. 100' STA. 31+30 EL. 10.0
PROFILE CR
CN 0+00 = CR 28+90
+4.7%
V.C. 200' STA. 2+00 EL. 30.78
V.C. 150' STA. 7+42.8 EL. 14.50
CN 15+10 = FN 179+50
PROFILE CN
SC 0+00 = FN 184+90
V.C. 100' STA. 1+40 EL. 12.61
SC 3+10 = CN 9+50
-0.23%
V.C. 50' STA. 0+25 EL. 13.19
PROFILE SC
BS 0+00 = BE 0+00
℄ CS
℄ FSC
℄ COLLINGS RD (TO BE ABANDONED)
℄ BE
BS 27+00 = FS 206+34
V.C. 100' STA 21+80 EL. 13.10
PROFILE BS
NEW JERSEY STATE HIGHWAY DEPARTMENT
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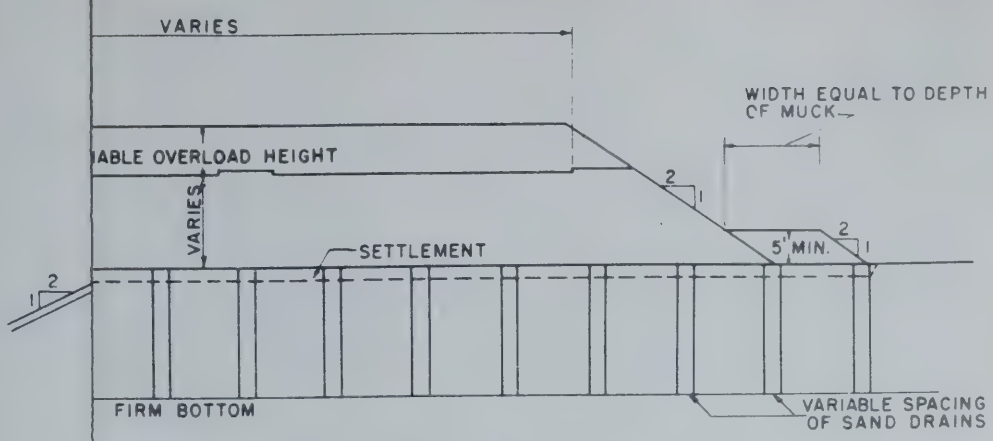
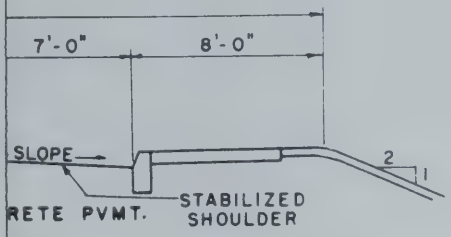
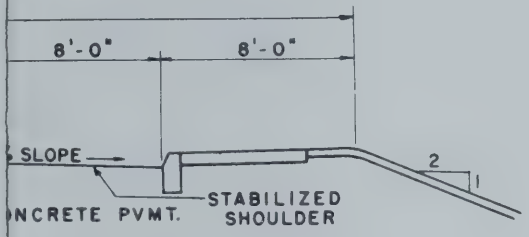
AND GLOUCESTER, N.J.
PROFILES
SCALES HORIZ 0 100 200 300 FEET
VERT 0 5 10 20 30 FEET
AMMANN & WHITNEY
CONSULTING ENGINEERS
APRIL, 1953

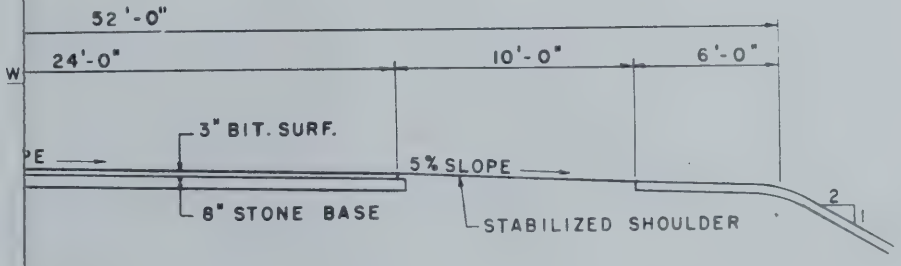
Plate 8

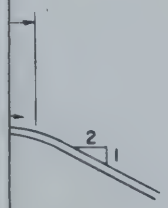


NKMENT AND STABILIZATION









NEW JERSEY STATE HIGHWAY DEPARTMENT
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NEW JERSEY APPROACHES AND HIGHWAY CONNECTIONS
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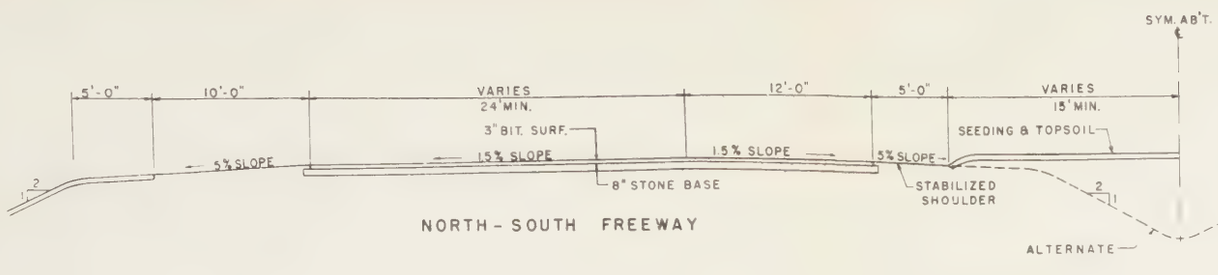
CONNECTING
PACKER AVE., PHILADELPHIA, PA.
AND GLOUCESTER, N.J.

TYPICAL SECTIONS
OF ROADWAYS & EMBANKMENTS

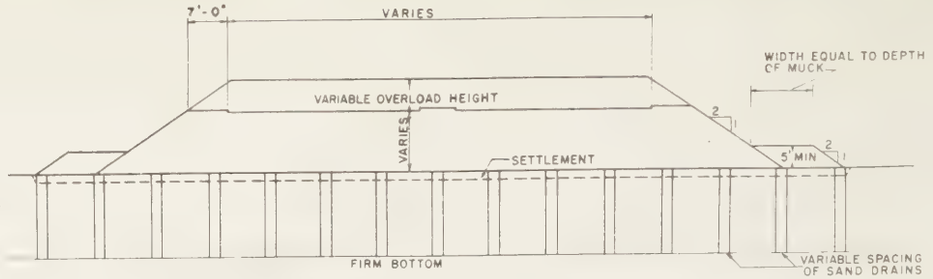
AMMANN & WHITNEY
CONSULTING ENGINEERS

APRIL, 1953

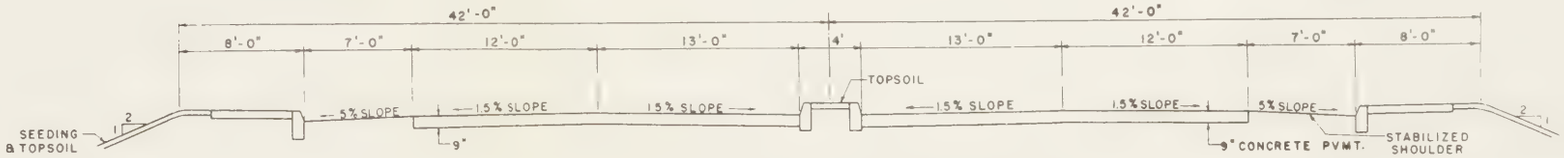
Plate 9



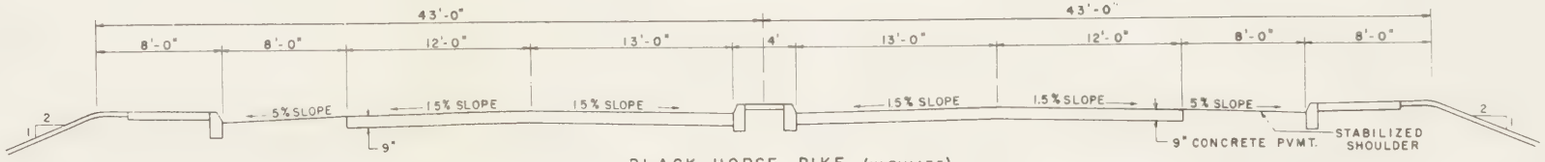
NORTH - SOUTH FREEWAY



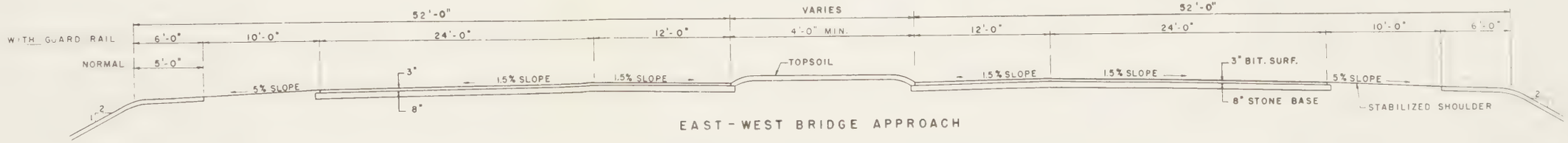
TYPICAL EMBANKMENT AND STABILIZATION



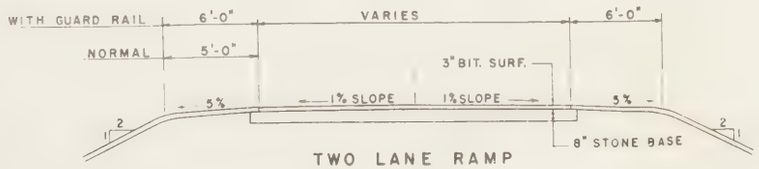
CRESCENT BOULEVARD (ULTIMATE)



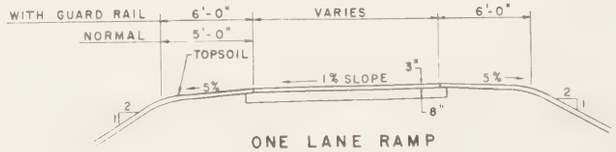
BLACK HORSE PIKE (ULTIMATE)



EAST - WEST BRIDGE APPROACH



TWO LANE RAMP



ONE LANE RAMP

NEW JERSEY STATE HIGHWAY DEPARTMENT
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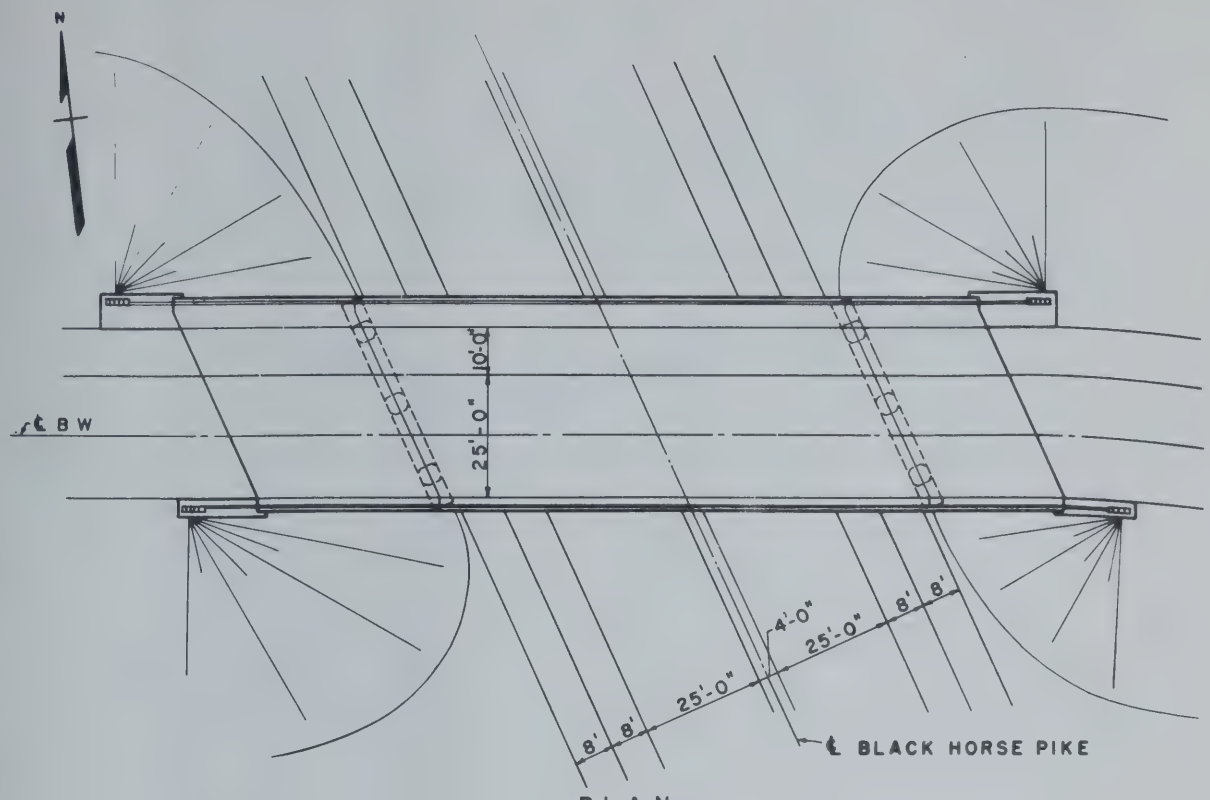
DELAWARE RIVER PORT AUTHORITY
NEW JERSEY APPROACHES AND HIGHWAY CONNECTIONS
TO
DELAWARE RIVER BRIDGE
CONNECTING
PACKER AVE., PHILADELPHIA, PA.
AND GLOUCESTER, N.J.

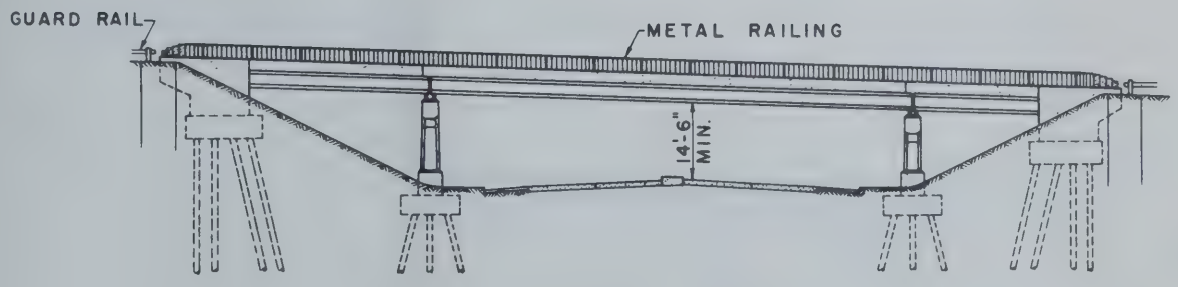
TYPICAL SECTIONS
OF ROADWAYS & EMBANKMENTS

AMMANN & WHITNEY
CONSULTING ENGINEERS

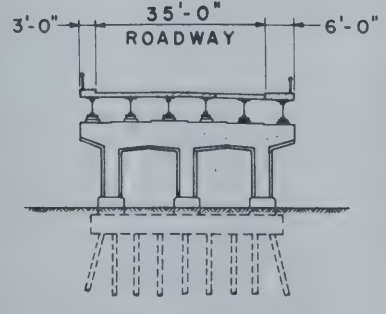
APRIL, 1953



PLAN



ELEVATION



TYPICAL SECTION

NEW JERSEY STATE HIGHWAY DEPARTMENT
AND
DELAWARE RIVER PORT AUTHORITY
NEW JERSEY APPROACHES AND HIGHWAY CONNECTIONS
TO
DELAWARE RIVER BRIDGE
CONNECTING
PACKER AVE., PHILADELPHIA, PA.
AND GLOUCESTER, N.J.

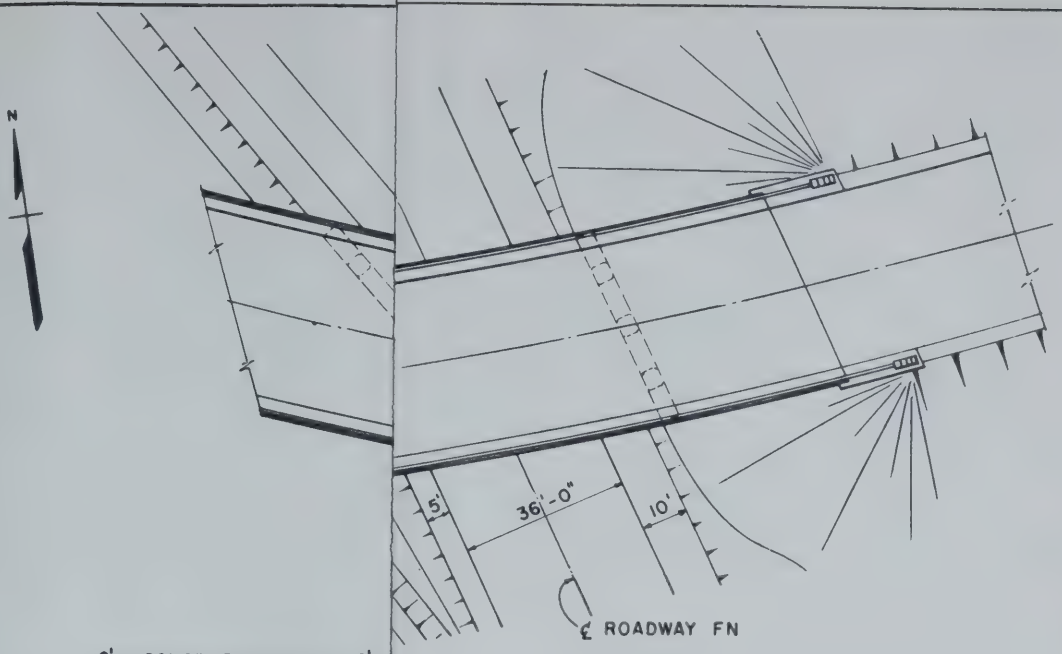
GRADE SEPARATION STRUCTURE
BETWEEN BLACK HORSE PIKE AND THE
EAST - WEST BRIDGE APPROACH

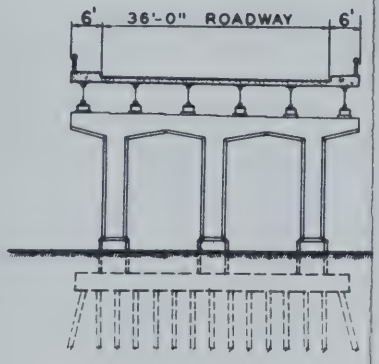
0 20 40
SCALE IN FEET

AMMANN & WHITNEY
CONSULTING ENGINEERS

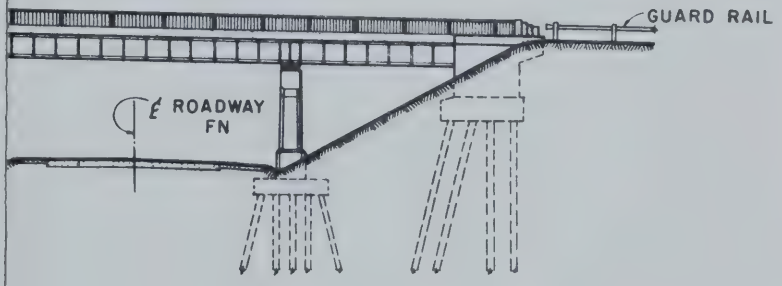
APRIL, 1953

Plate 10





TYPICAL CROSS SECTI



NEW JERSEY STATE HIGHWAY DEPARTMENT
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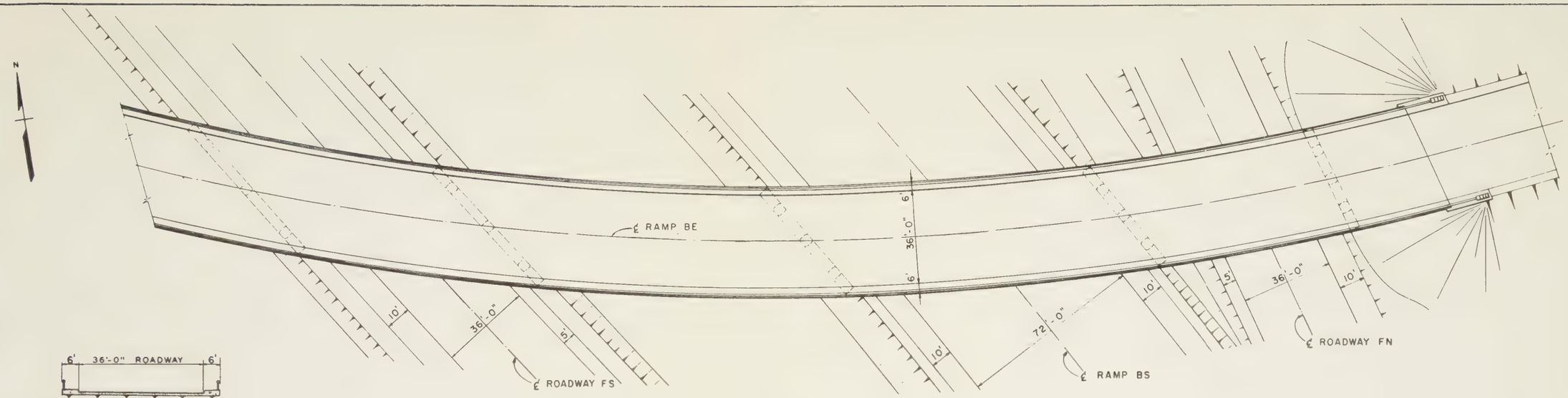
NEW JERSEY APPROACHES AND HIGHWAY CONNECTIONS
TO
DELAWARE RIVER BRIDGE
CONNECTING
PACKER AVE., PHILADELPHIA, PA.
AND GLOUCESTER, N.J.
EAST BOUND EAST-WEST BRIDGE APPROACH
OVER THE NORTH-SOUTH FREEWAY

AMMANN & WHITNEY
CONSULTING ENGINEERS

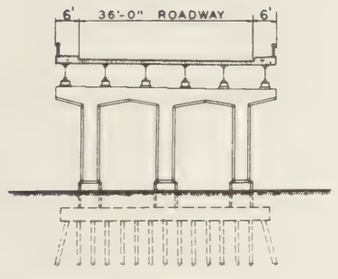
0 10 20 30 40 50
SCALE IN FEET

APRIL, 1953

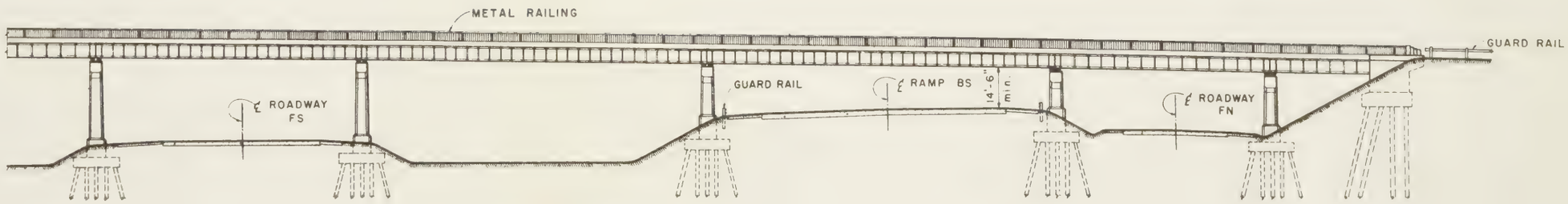
Plate 11



PLAN



TYPICAL CROSS SECTION



ELEVATION

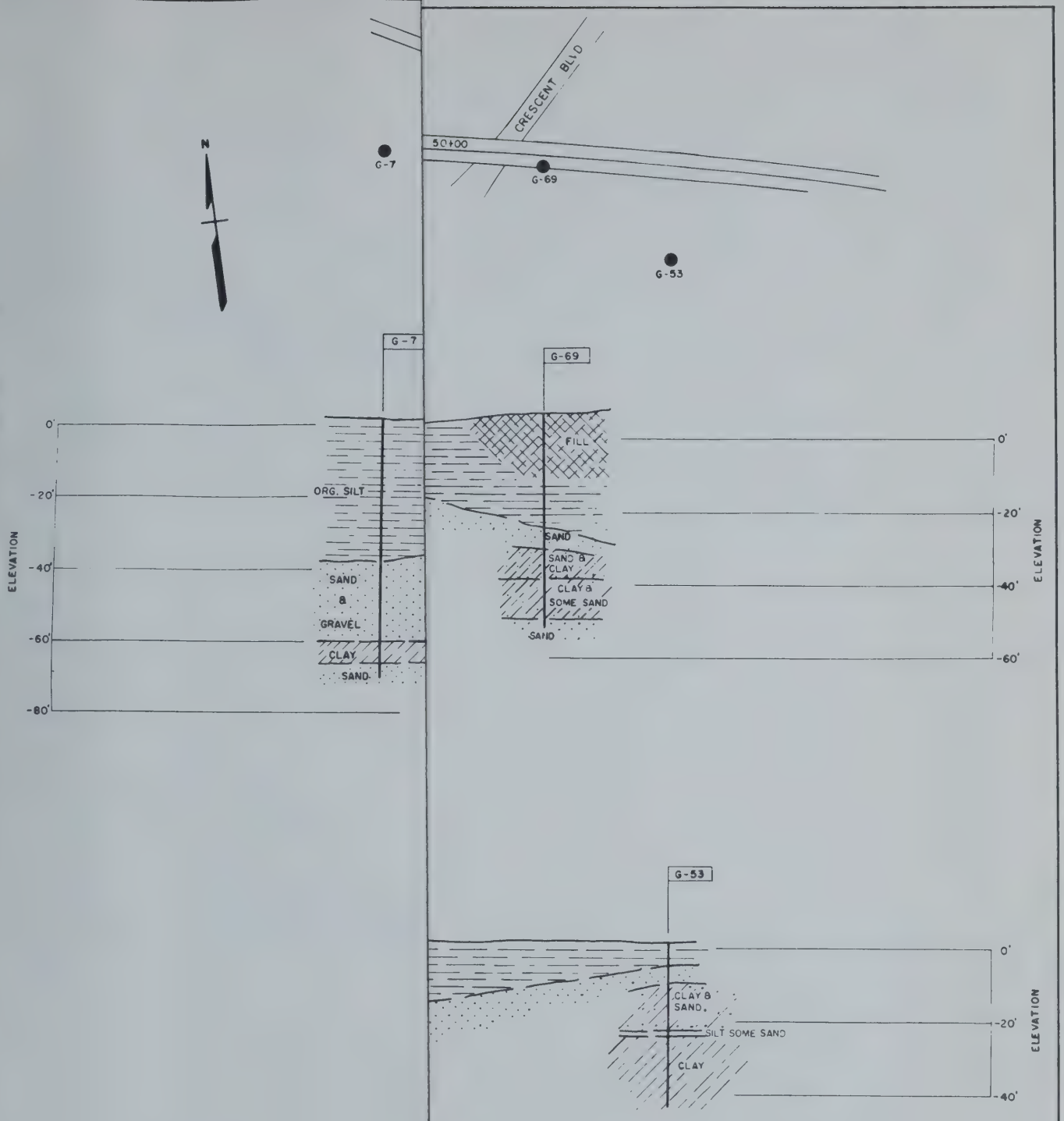
NEW JERSEY STATE HIGHWAY DEPARTMENT
AND
DELAWARE RIVER PORT AUTHORITY
NEW JERSEY APPROACHES AND HIGHWAY CONNECTIONS
TO
DELAWARE RIVER BRIDGE
CONNECTING
PACKER AVE., PHILADELPHIA, PA.
AND GLOUCESTER, N.J.
EAST BOUND EAST-WEST BRIDGE APPROACH
OVER THE NORTH-SOUTH FREEWAY

AMMANN & WHITNEY
CONSULTING ENGINEERS

0 10 20 30 40 50
SCALE IN FEET

APRIL, 1953

Plate 11



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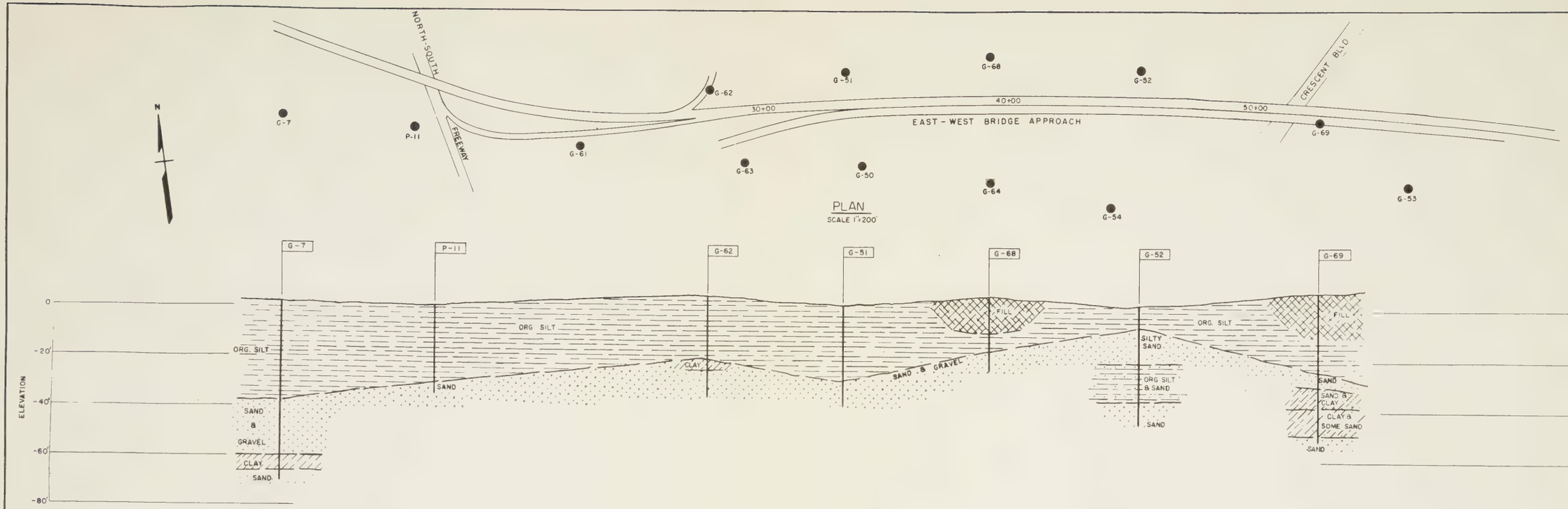
AND GLOUCESTER, N.J
SOIL PROFILE

PREPARED BY
PORTER-URQUHART & BEAVIN
CONSULTING ENGINEERS
NEWARK, N.J.

AMMANN & WHITNEY
CONSULTING ENGINEERS

APRIL, 1953

Plate 12



LEGEND

SAND
ORG SILT
CLAY
FILL

NEW JERSEY STATE HIGHWAY DEPARTMENT
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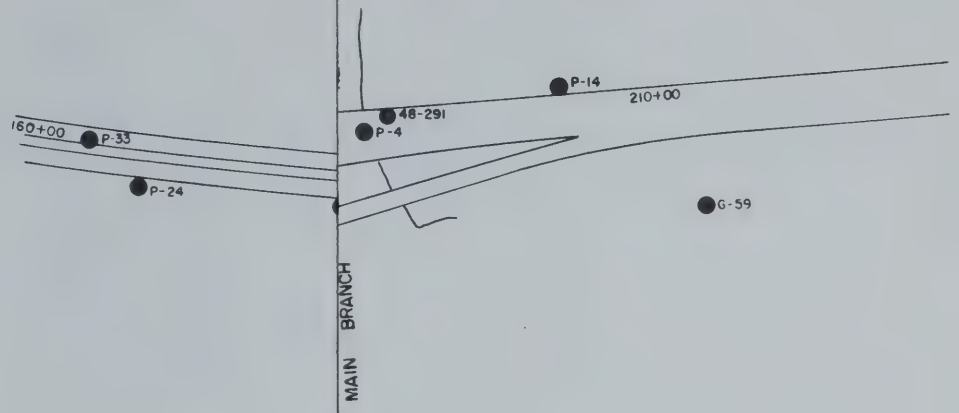
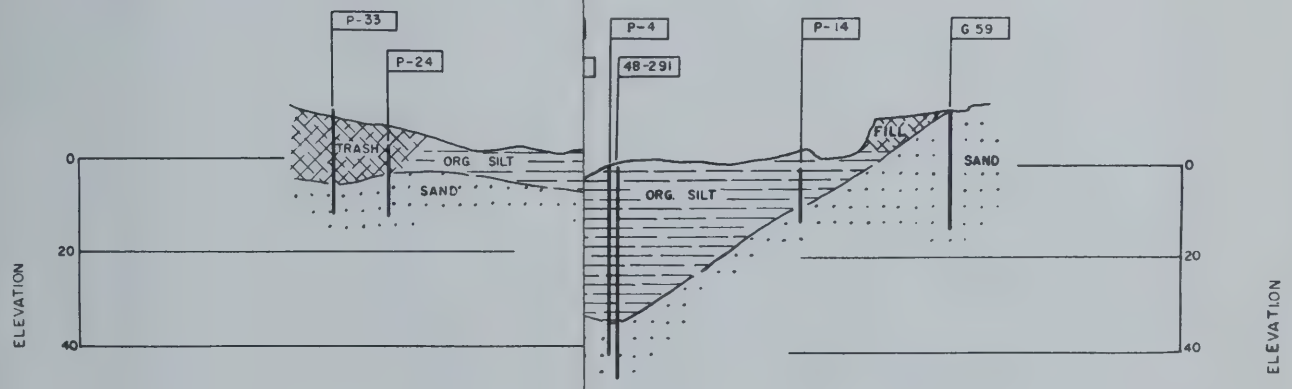
Plate 12





NEW JERSEY STATE HIGHWAY DEPARTMENT
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NEW JERSEY APPROACHES AND HIGHWAY CONNECTIONS TO DELAWARE RIVER BRIDGE

CONNECTING

PACKER AVE., PHILADELPHIA, PA.
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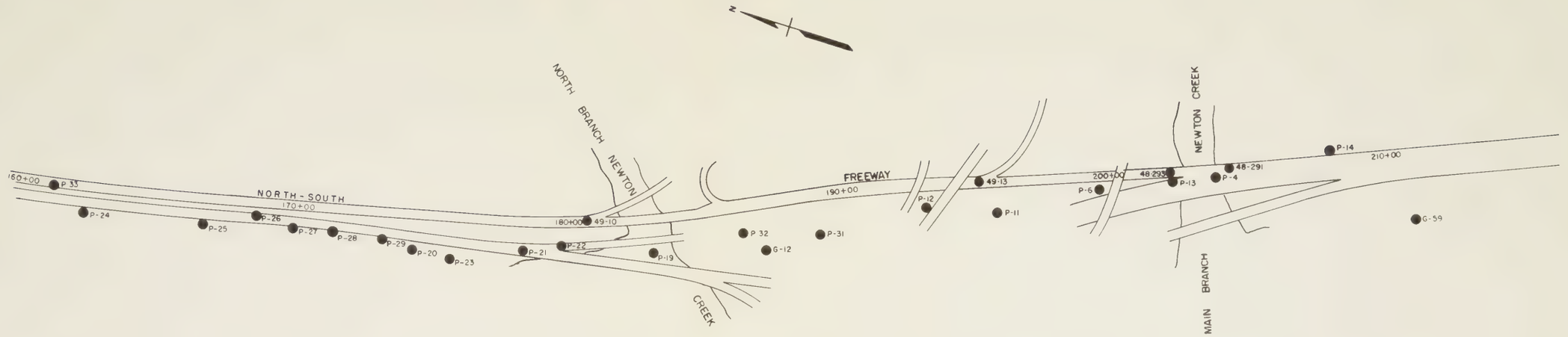
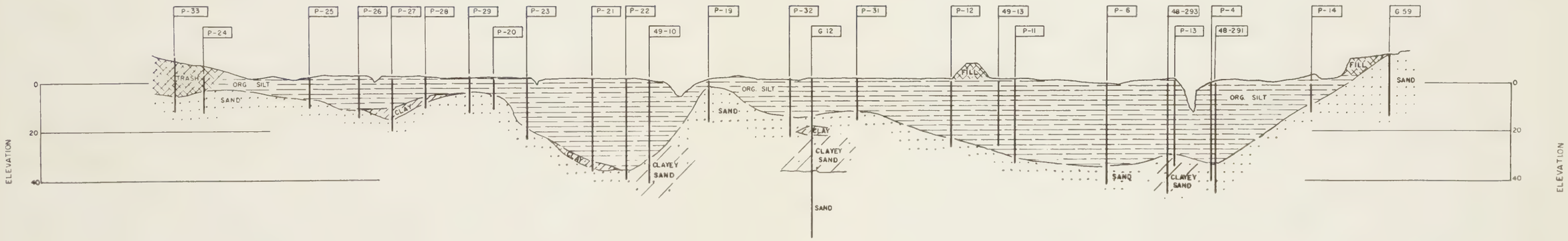
ONSULTING ENGINEERS

APRIL, 1953

Plate 12A



PLAN
SCALE 1"=200'



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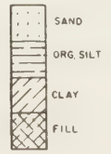

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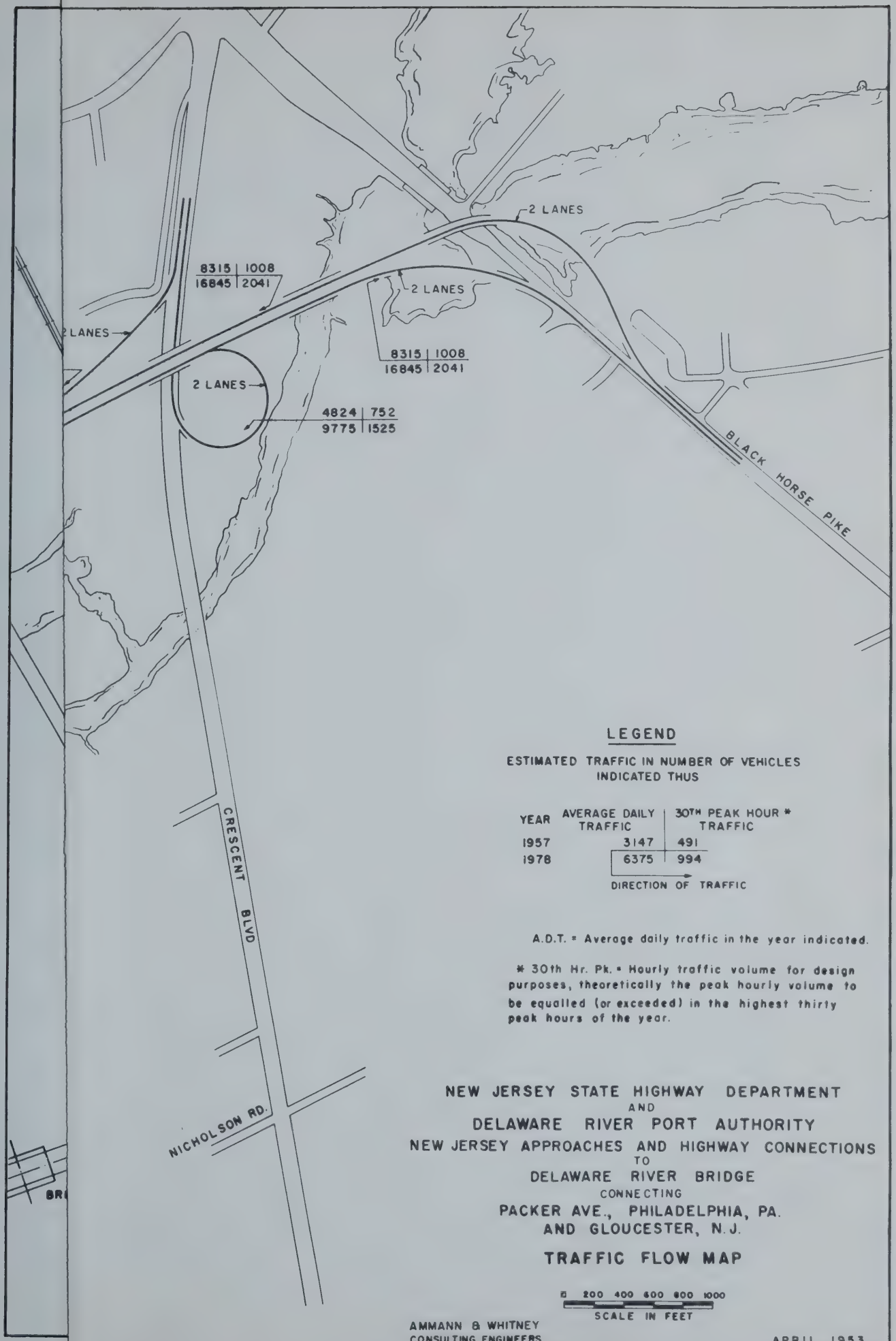
Plate 12A



LEGEND

ESTIMATED TRAFFIC IN NUMBER OF VEHICLES INDICATED THUS

YEAR	AVERAGE DAILY TRAFFIC	30TH PEAK HOUR * TRAFFIC
1957	3147	491
1978	6375	994

DIRECTION OF TRAFFIC

A.D.T. = Average daily traffic in the year indicated.

* 30th Hr. Pk. = Hourly traffic volume for design purposes, theoretically the peak hourly volume to be equalled (or exceeded) in the highest thirty peak hours of the year.

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TRAFFIC FLOW MAP

0 200 400 600 800 1000
SCALE IN FEET

AMMANN & WHITNEY
CONSULTING ENGINEERS

APRIL, 1953

Plate 13

LEGEND

ESTIMATED TRAFFIC IN NUMBER OF VEHICLES INDICATED THUS

YEAR	AVERAGE DAILY TRAFFIC	30TH PEAK HOUR * TRAFFIC
1957	3147	491
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TRAFFIC FLOW MAP

0 200 400 600 800 1000
SCALE IN FEET

AMMANN & WHITNEY
CONSULTING ENGINEERS

APRIL, 1953

Plate 13

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3 0112 114097089